



INTERNATIONAL RECTIFIER

*POWER
SEMICONDUCTORS
PRODUCT
DIGEST
92 / 93*

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About this catalog . . .

This is a highly comprehensive Power Semiconductor Catalog featuring International Rectifier's complete line of state-of-the-art devices designed for virtually every power conversion and/or conditioning application. To locate the device for your specific requirement, check the Table of Contents.

PRODUCT LITERATURE

Data sheets are available for each device covered in this catalog. You are invited to contact your local IR field representative or our home office for additional product information (see below).

OTHER DATA/ORDER FORM

International Rectifier also has other highly informative technical literature of interest to semiconductor users, including reliability reports and application notes. These periodicals are listed in the Available Literature section of this catalog.



PRODUCT DIGEST

Short Form Catalog 92/93

HEXFET Power MOSFETs
Power ICs
Microelectronic Relays
Power Interface Products
IGBTs
Schottky Diodes
HEXFRED
Fast & Ultra-Fast Rectifiers
Standard Recovery Rectifiers
Inverter SCRs
Phase Control SCRs
Bridges
Power Modules
Die (HEXFET/Schottky)
Die (Rectifier/SCR)
Government/Space Products
Standard/Custom Assemblies

First Printing



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Rectifier

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Short Form Catalog 92193

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Die (Rectifier/SCR)
Government/Space Products
Standard Custom Assemblies

International Rectifier does not recommend the use of its devices in life support applications wherein such use may directly threaten life or injury due to device failure or malfunction. Users of International Rectifier devices in life support applications assume all risks of such use and indemnifies International Rectifier against all damages resulting from such use.

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Power Integrated Circuits

FEATURES

- Latest Low Power Consumption BCDMOS Technology
- Power and Control on Single Chip
- Both High and Low Voltage Products Available
- High Performance/High Reliability Monolithic PIC
- 500V and 600V Drivers for use in HEXFET and IGBT Circuits
- Motor Control ICs, and Offline DC/DC Converters Available

International Rectifier has expanded its power integrated circuit (PIC) product line to address additional applications which require both power and control.

High Voltage Power IC (HV PIC)

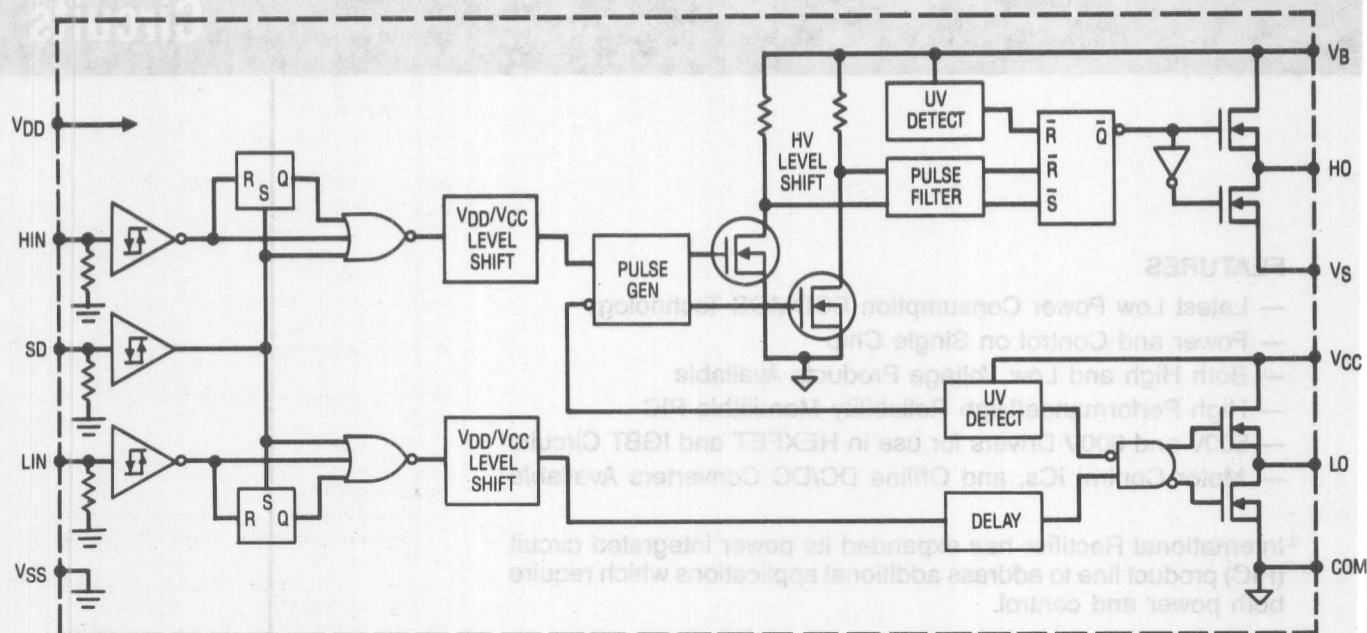
With a voltage range to 600 volts, IR's unique high voltage junction isolated BCDMOS technology makes it possible to combine the power MOSFET with analog and digital control circuitry on a single silicon chip, producing a new family of off-line monolithic functions for power converters and motor control applications.

Low Voltage Power IC (LV PIC)

For applications under 80 volts, International Rectifier employs a low voltage junction isolated BCDMOS power integrated circuit technology. This technique will enable IR to provide low voltage power IC's for automotive, computer peripheral, medical instrumentation, office automation, motor control and power converter applications.


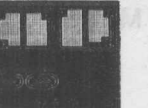


For detailed information and technical assistance contact your local sales office or International Rectifier's Power Integrated Circuit Marketing Group.

High Voltage MOS Gate Driver IR2110



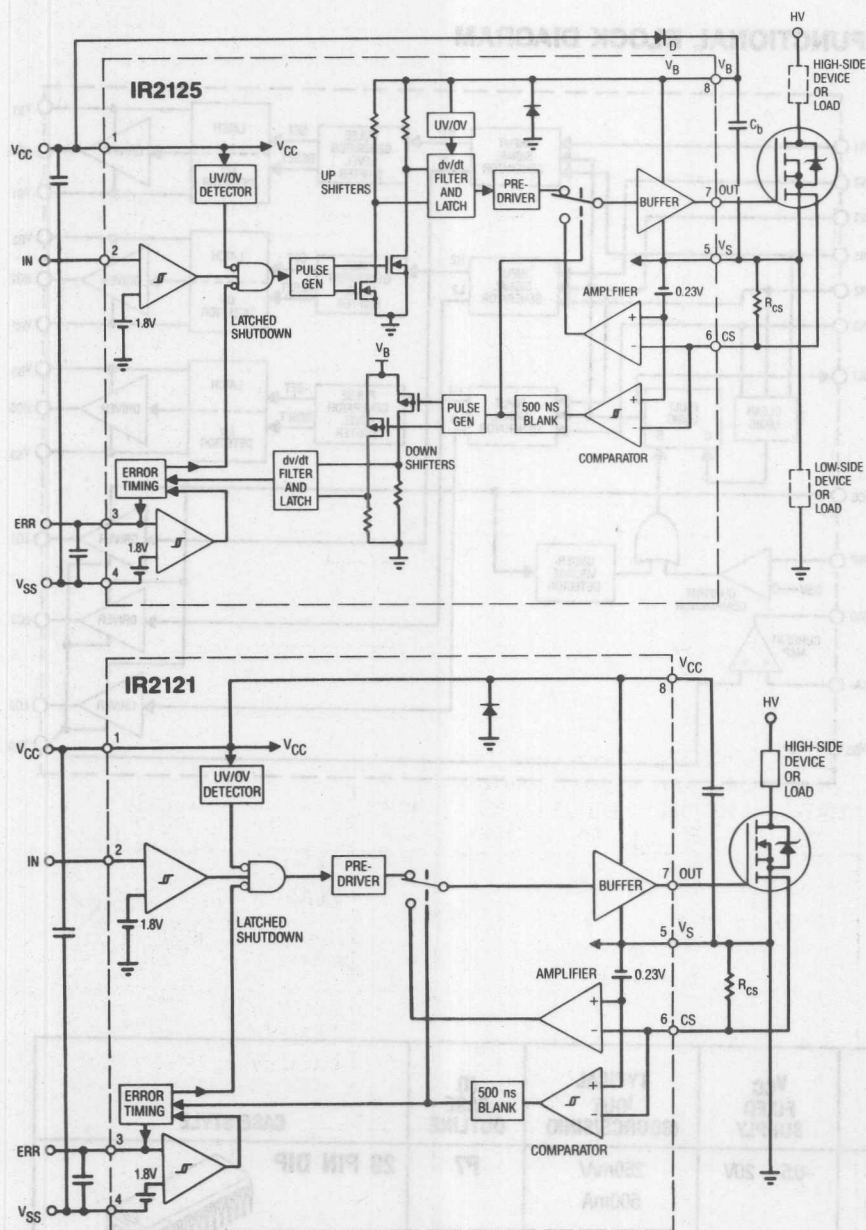
FEATURES

- Drives a pair of HEXFETs or IGBTs
- Two Independent Channel Drivers
 - One Floating High Side Driver
 - One Ground Referenced Low Side Driver
- Operates to 500V
- 2 Amperes Peak Current Drive Capability
- Operates to 500 KHz
- High dv/dt ($> \pm 50V/ns$) Immunity
- CMOS and LSTTL Compatible Schmitt Trigger Inputs
- Low Quiescent Power Dissipation
- Undervoltage Lockout with Hysteresis (both channels)
- 25 ns Typical Switching Time (into 1000 pf load)
- Matched Delay Times for Both Channels (within 10 ns)
 - 120 ns Turn-on Delay
 - 94 ns Turn-off Delay
- Cycle by Cycle Edged Triggered Latched Shutdown
- Logic Supply Return Can Swing $\pm 5V$ from Power Ground
- Floating Supply Offset $-5V$ from Power Ground
- Latch Immune CMOS (withstands $> 2A$ reverse current at I/O pins)

PART NUMBER	V _S OFFSET SUPPLY VOLTAGE (V)	V _{BS} , V _{CC} OUTPUT VOLTAGE (V)	I _{OUT} SINK, SOURCE (A)	CASE/DIE OUTLINE NO. (4)	NOTES	CASE STYLE
IR2110	10-500	10-20	2	P2	—	14 PIN PLASTIC 
IR2110L	10-500	10-20	2	P3	—	14 PIN CERAMIC MO-036AB  Same as above except ceramic
IR2110C	10-500	10-20	2	P5	(2)	DIE 
IR2110S	10-500	10-20	2	P4	(1)	16 PIN WIDE BODY SURFACE MOUNT 
IR2119	10-500	10-20	2	—	(3)	DESIGNER'S KIT IN 9 x 12 x 1" VELCRO BOX

- (1) — Consult factory for minimum order quantity.
 (2) — Provided in waffle pack, 100 die to a pack.
 (3) — For Kit Information and contents see page 12.
 (4) — For case outline drawing see page 144.

Current Limiting MOS Gate Drivers



FEATURES

- Current detection and limiting loop to limit driven power transistor current
 - Trip point at 230 mV with 30 mV hysteresis
 - Leading edge blanking time of 500 ns
- Error pin indicates fault conditions and programs shutdown time
 - Latched shutdown threshold at 1.8V
 - Source current of 100 μ A to charge timing capacitor
 - Filter time of 1 μ s for noise immunity
- Wide gate drive supply range from 10 to 20V
- Under and over-voltage lockout with hysteresis
- Output driver designed to drive MOS-gated power devices
 - $R_{(on)}$ of pull-up driver typically at 9 ohm
 - $R_{(on)}$ of pull-down driver typically at 3 ohm
 - Switching time of 43/27 ns typical t_r/t_f into 3300 pF load

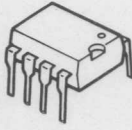
- Propagation delay time of 140 ns typical

IR2125

- High voltage (500V) operation.
- Floating supply designed for bootstrap operation
 - Operating offset range from -5 to +500V
 - dv/dt immunity rated at $\pm 50V/ns$
 - Quiescent power dissipation of 7.5 mW at 15V

IR2121

- 20 volt operation

PART NUMBER	V_B FLOATING SUPPLY	V_S FLOATING SUPPLY OFFSET	V_{CC} FIXED SUPPLY	V_O OUTPUT VOLTAGE	(1) CASE OUTLINE	NOTES	CASE STYLE
IR2125	-0.5 - ($V_S + 20$)	- 5 - 500V	- 0.5 - 20V	($V_S - 0.5$) - ($V_B + 0.5$)	P6		8 PIN DIP 
IR2121	—	—	- 0.5 - 20V	($V_S - 0.5$) - ($V_{CC} + 0.5$)			
IR2129	—	—	—	—			DESIGNERS KIT See page 12

(1) For case outline drawing see page 144.

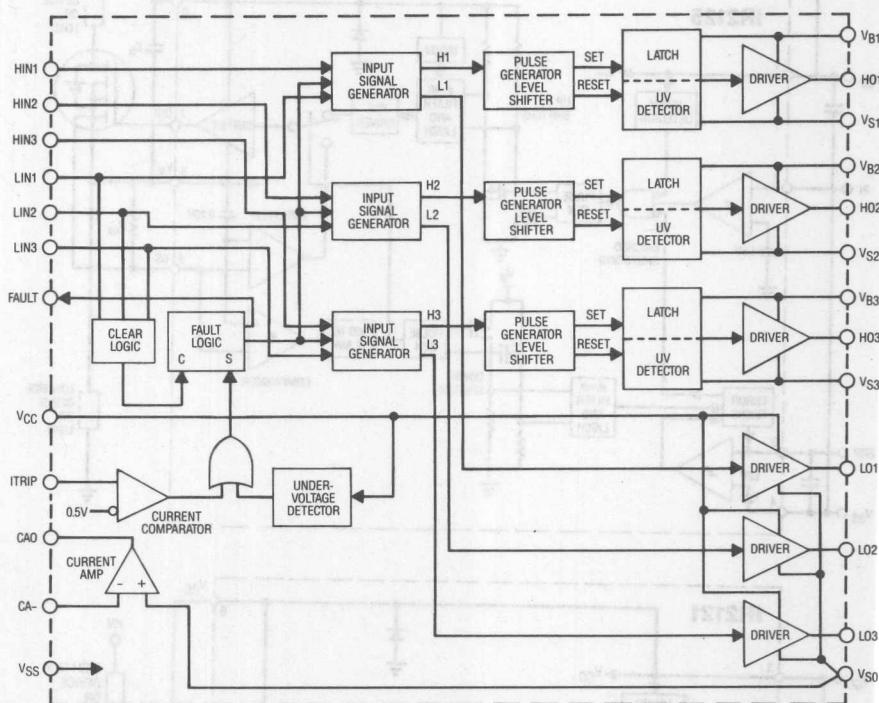
High Voltage Three Phase MOS Gate Driver

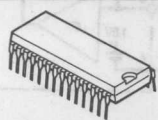
IR2130

FEATURES

- High voltage (600V) operation
- Output driver designed to drive MOS-gated power devices
 - Output drive of 250mA/500mA typical source/sink
 - Switching time of 75/35ns typical t_r/t_f into 1000pF load
- Independent half bridge drivers
 - Three floating high voltage drivers
 - Three ground referenced drivers
- Floating supply designed for bootstrap operation
 - Operating offset range from -5 to +600V
 - dv/dt immunity rated at $\pm 50V/ns$
 - Quiescent power dissipation of 30mW at 15V
- Over-current shut down turns off all six drive outputs
 - Trip point at 485mV with 100mV hysteresis
 - Leading edge blanking time of 400ns typ
- Current amplifier provides linear voltage proportional to bridge current
- Input logic provides 2 μs deadtime between high side and low side
 - 250ns min input filter for noise immunity
- Fault pin indicates over-current shut down and undervoltage lockout
- Propagation delay time of 630ns/400ns typical t_{on}/t_{off}
- Wide gate drive supply range from 10 to 20V
- Under-voltage lockout (8.65V typ) with hysteresis for all channels

FUNCTIONAL BLOCK DIAGRAM

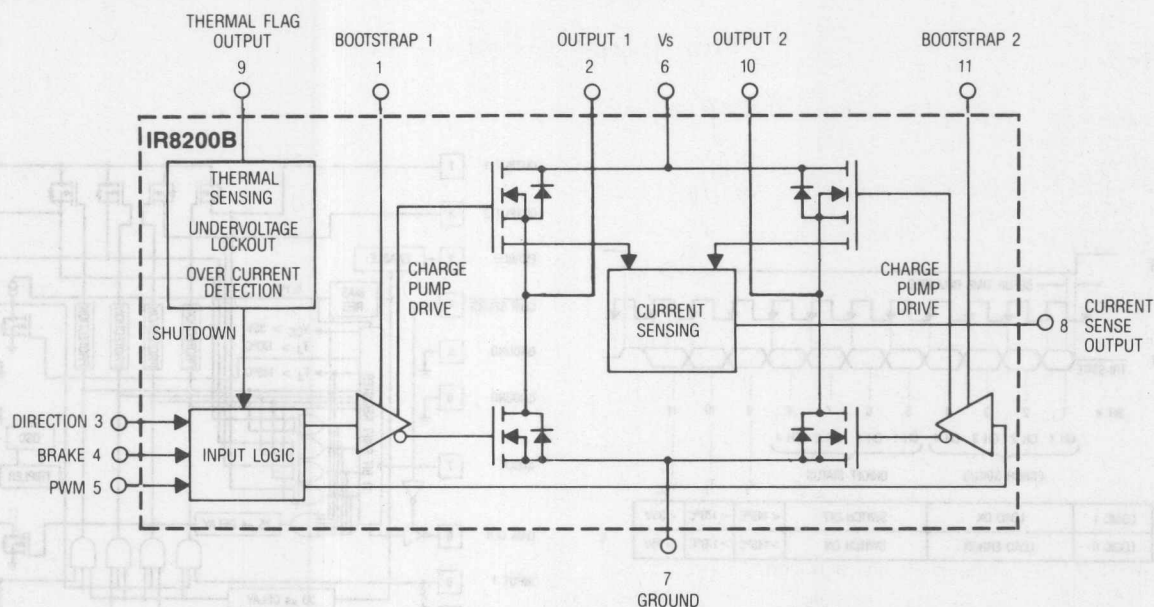


PART NUMBER	V_B	V_S FLOATING SUPPLY OFFSET	V_{CC} FIXED SUPPLY	TYPICAL I_{OUT} (SOURCE/SINK)	(1) CASE OUTLINE	CASE STYLE
IR2130	$(V_{S1,2,3} + 10)$ $-(V_{S1,2,3} + 20)$	$(V_{S0} - 0.5) -$ $(V_{S0} + 600)$	-0.5 - 20V	250mA/ 500mA	P7	28 PIN DIP 

(1) For case outline drawing see page 144.

3A, 55V DMOS H-BRIDGE

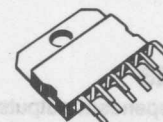
IR8200B



FEATURES

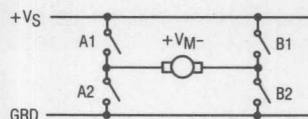
- High Efficiency H-Bridge DMOS Output Stage
 - High Current Output — 3A Continuous.
 - 6A Peak.
 - up to 55 Volts Operation.
 - Low $R_{ds(on)}$ — 0.3 ohm per switch.
- Lossless HEXSense(TM) Current Sensing
 - 380 μ A/A Analog Feedback.
- Thermal Flag Output at 145°C.
- Rugged Internal Clamp Diodes.
 - $T_{rr} = 100$ ns.
- On-board Protection.
 - Thermal Shutdown at 170°C.
 - Undervoltage Lockout at 11V.
 - Overcurrent Shutdown above 6A.
 - Deadband of 60ns to avoid Shoot-Through.
- CMOS Control.
 - Low Quiescent Current — 20 mA.
 - User Selectable Drivers.
 - Charge Pump or Bootstrap.
- User Friendly Inputs.
 - TTL and CMOS Compatible.
 - On-Chip Decoding of Motor Oriented Commands.
 - PWM, Direction and Brake.
- High Power package.
 - 11 pin Single In-line. (1.5 ϕ JC)

PART NUMBER	V_{IN} (V)	V_{OUT} (V)	I_O CONT (A)	I_O PEAK (A)	CASE OUTLINE (1)	NOTES	CASE STYLE
IR8200B	11-55	11-55	3	6	P1		11 PIN SIP PLASTIC



COMPARISON BETWEEN LOCKED ANTIPHASE & SIGN/MAGNITUDE PWM CONTROL AS RELATED TO THE IR8200

TWO CONTROL MODES FOR THE IR8200B



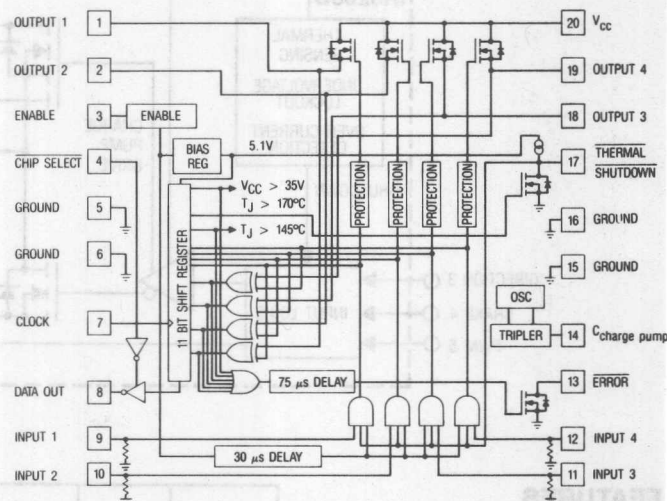
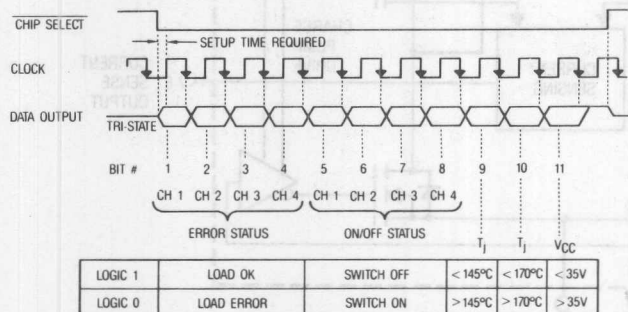
	LOCKED ANTIPHASE	SIGN/MAGNITUDE
DEVICE SEQUENCE	 BOTH SIDES TOGGLED	 ONE SIDE TOGGLED
VOLTAGE SEEN BY THE LOAD		
REVERSAL	$+V_M$ IF $D > 0.5$ $-V_M$ IF $D < 0.5$ $D = \text{DUTY CYCLE}$	$+V_M$ IF B2 ON $-V_M$ IF A2 ON

CHARACTERISTIC	LOCKED ANTIPHASE	SIGN/MAGNITUDE
Output ripple voltage	Relatively high	Relatively low
Input ripple current	Relatively high	Relatively low
Control discontinuity around zero	No	Yes (generally)
Current Sensing	Sense signal is chopped. May need "reconstruction"	Sense signal always represents load current, (except for regeneration)
Diode commutation losses	Low	Lower
Switching losses	Low	More than 50% lower for same frequency
Load power regeneration	Yes	Yes

(1) For case outline drawing see page 144.

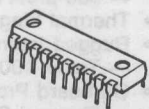
QUAD HIGH SIDE SWITCH

IR8400P



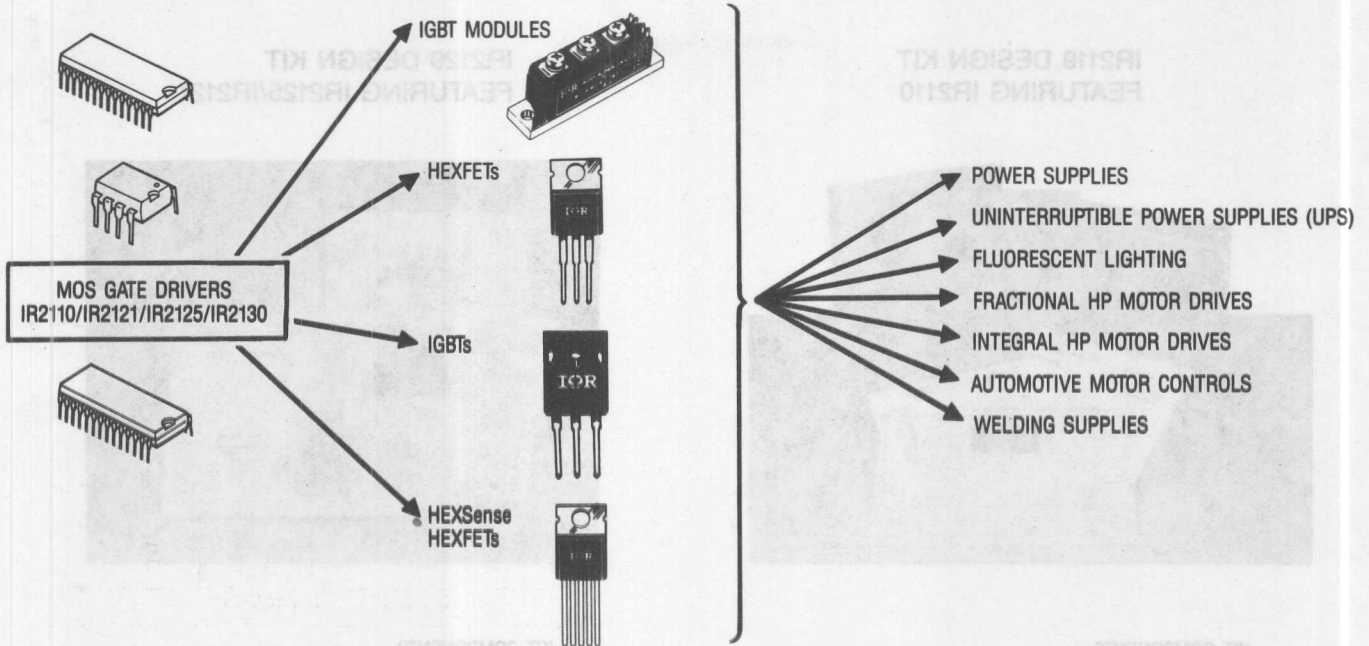
FEATURES

- Four independent outputs with $\leq 3A$ peak, 1A continuous current capability
- 1.3 Ω maximum ON resistance over operating temperature range
- True instantaneous power limit at 15W per switch
- High survival voltage (60V DC, 80V transient)
- -5V output clamp for discharging inductive loads
- Shorted load (to ground and supply) protection
- Two step over-temperature warning and shutdown
- Over-voltage shutdown at $V_{CC} \leq 35V$
- < 10 μA supply current in "sleep" mode
- LSTTL/CMOS compatible logic inputs and outputs
- Serial data interface for 11 diagnostic checks:
 - Switch ON/OFF status
 - Open or shorted load
 - Operating temperature
 - Excessive supply voltage
- Two direct-output error flags
- Junction-to-case thermal resistance at 20°C/W

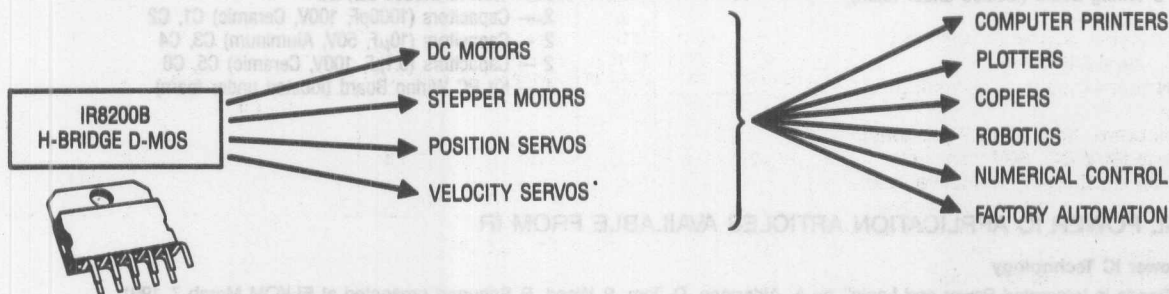
PART NUMBER	CONT SUPPLY VOLT	IND STATE OUTPUT CURRENT	IND TRANS OUTPUT CURRENT	TOTAL TRANS OUTPUT CURR	(1) CASE OUTLINE	NOTES	CASE STYLE
IR8400P	-0.5-60V	1A	3.75A	6A	P8		20 PIN DIP 

(1) For case outline drawing see page 144.

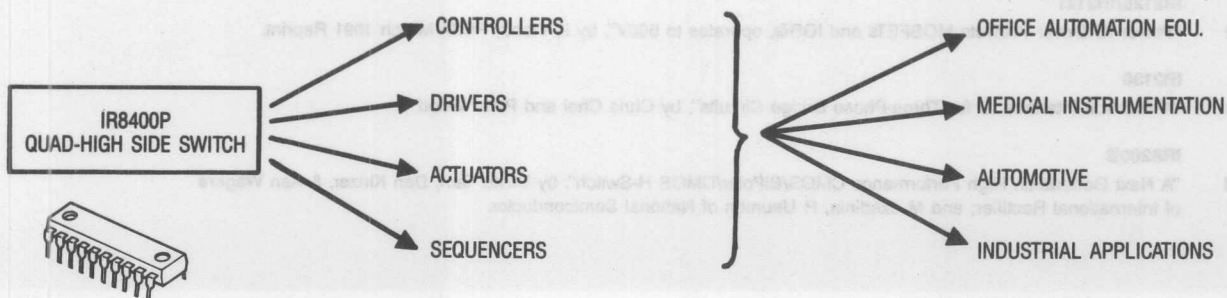
Use MOS gate drivers (IR2110/IR2121/IR2125/IR2130) to drive power components for these applications.



Use the IR8200B to power motors/servos for these applications.

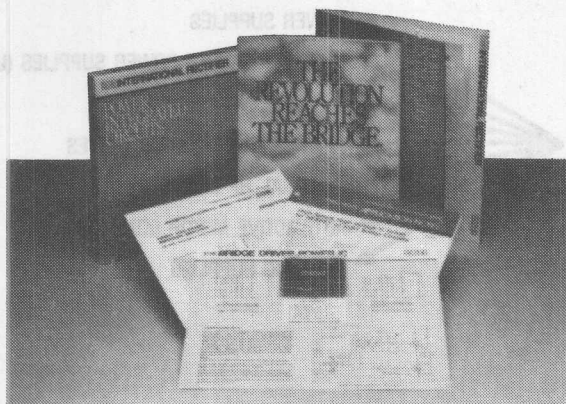


Use the IR8400P as a switch in supervisory circuits.



Application Materials:

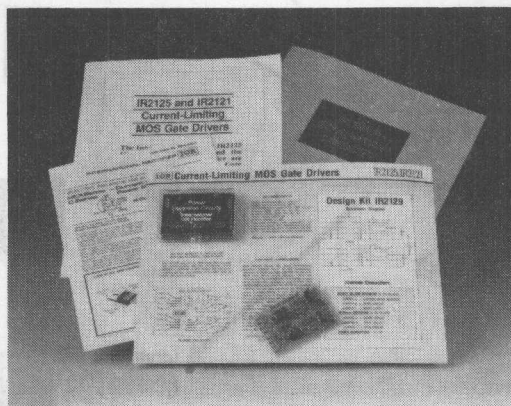
IR2119 DESIGN KIT FEATURING IR2110



KIT COMPONENTS

- 2 — IR2110 MOS Gate Drivers (500V, 2A)
- 2 — IR830 HEXFETs (500V, 4.5A) — Q1, Q2
- 1 — 10KF6 Diode (600V, 1A) — D1
- 1 — Capacitor (0.047 μ F, 50V) — C1
- 2 — Resistors (47 Ω , 1/4W, 5%) — R1, R2
- 1 — Resistor (10 Ω , 1/4W, 5%) — R3
- 1 — Kit PC Wiring Board (located under foam)

IR2129 DESIGN KIT FEATURING IR2125/IR2121



KIT COMPONENTS

- 1 — IR2125 MOS Gate Driver (500V)
- 1 — IR2121 MOS Gate Driver (20V)
- 2 — IRC830 HEXSense power FETs (500V) Q1, Q2
- 2 — Resistors (22 Ω , .25W, 5%) R1, R3
- 2 — Resistors (120 Ω , .25W, 5%) R2, R4
- 1 — 10KF6 Diode (600V) D1
- 2 — 1N4148 Diodes D2, D3
- 2 — Capacitors (1000pF, 100V, Ceramic) C1, C2
- 2 — Capacitors (10 μ F, 50V, Aluminum) C3, C4
- 2 — Capacitors (0.1 μ F, 100V, Ceramic) C5, C6
- 1 — Kit PC Wiring Board (located under foam)

ADDITIONAL POWER IC APPLICATION ARTICLES AVAILABLE FROM IR

NUMBER Power IC Technology

- ER91-1 "Trends in Integrated Power and Logic", by A. Alderman, D. Tam, P. Wood, P. Schugart presented at ELKOM March 7, 1991.
- ER92-1 "MGDs: High Performance Integrated Drivers for Power MOSFETs & IGBTs", by Arnold Alderman and Steve Clemente

IR2110

- ER90-1 "High Voltage Chipset for Offline System Designs", by David Tam and Dan Kinzer.
- ER90-3 "New High-Voltage Bridge Driver Simplifies PWM Inverter Design", by D. Grant and B. Pelly, presented at 1989 PCIM Conference.

IR2125/IR2121

- ER91-2 "Power IC Driver Protects MOSFETs and IGBTs, operates to 500V", by P. Wood, PCIM March 1991 Reprint.

IR2130

- ER91-3 "A 600 Volt Interface IC for Three-Phase Bridge Circuits", by Chris Choi and Peter Wood

IR8200B

- ER90-4 "A Next Generation High Performance CMOS/BiPolar/DMOS H-Switch", by David Tam, Dan Kinzer, & Ken Wagers of International Rectifier; and M. Izadinia, P. Ueunten of National Semiconductor.

Power Integrated Circuits

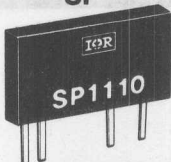
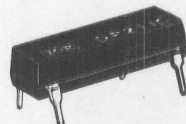
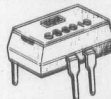
Microelectronic Relays

Model	Material	Length (mm)	Width (mm)	Height (mm)	Weight (kg)	Volume (cm ³)	Surface Area (cm ²)	Volume (cm ³)	Surface Area (cm ²)
1	Wood	1000	500	100	50	50000	15000	50000	15000
2	Wood	1000	500	100	50	50000	15000	50000	15000
3	Wood	1000	500	100	50	50000	15000	50000	15000
4	Wood	1000	500	100	50	50000	15000	50000	15000
5	Wood	1000	500	100	50	50000	15000	50000	15000
6	Wood	1000	500	100	50	50000	15000	50000	15000
7	Wood	1000	500	100	50	50000	15000	50000	15000
8	Wood	1000	500	100	50	50000	15000	50000	15000
9	Wood	1000	500	100	50	50000	15000	50000	15000
10	Wood	1000	500	100	50	50000	15000	50000	15000

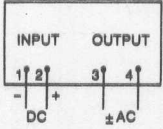
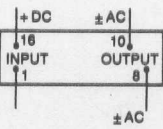
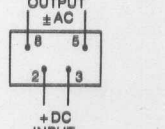
PIC Microelectronic Relays

ChipSwitch® Solid State Relay

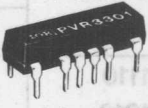
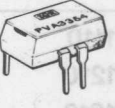

International
IOR Rectifier

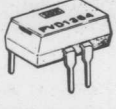
Part Number	Operating Voltage Range V(RMS)	Maximum Load Current @ 40°C A(RMS)	Trans. Overvolt V(Pk)	Turn-On Signal (DC)	Dielectric Strength Input/Output V(RMS)	Minimum Off State dv/dt @ Rated V 25°C V/μs	Maximum Off State Leakage μA	Outline Number (1)	Series
SP1110	20-140	1.0 Free Standing 3.0 With Heat Sink	300	5mA	4000	600	10	MR4	<div>SP</div> <div></div> <div>SP1110</div> <div>1 Form A</div>
SP1210	20-140		300	10mA					
SP2110	20-280		450	5mA					
SP2210	20-280		450	10mA					
SP6110	20-280		600	5mA					
SP6210	20-280		600	10mA					
DP1110	20-140	1.0	300	5mA	4000	600	10	MR2	<div>DP</div> <div></div> <div>1 Form A</div>
DP1210	20-140		300	10mA					
DP1610	20-140		300	3.5V					
DP2110	20-280		450	5mA					
DP2210	20-280		450	10mA					
DP2610	20-280		450	3.5V					
DP6110	20-280		600	5mA					
DP6210	20-280		600	10mA					
DP6610	20-280		600	3.5V					
CS5005	20-280	0.3	500	5mA	4000	1200	10	MR1	<div>CS</div> <div></div> <div>1 Form A</div>
CS5010	20-280		500	10mA					
CS6005	20-280		600	5mA					
CS6010	20-280		600	10mA					

Wiring Diagram

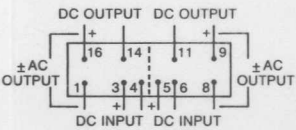
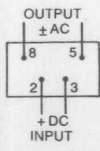
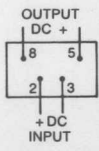
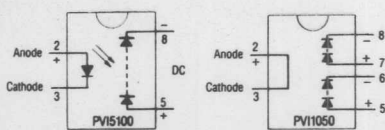
			
Series	SP	DP	CS

(1) For case outline drawing see page 147.

Part Number (1)	Operating Voltage Range V(Pk)	Max. On-State Res. @ 25°C Ohms		Max Load Current @ 40°C (DC) mA	Nom. Control Current (DC) mA	Min. Off-State Res. Ohms	Dielectric Strength Input/Output V(RMS)	Max. Response Time On/Off μ sec	Maximum Thermal Offset Voltage @ 5 mA Control μ V	Case Outline Number (2)	Series
		AC/DC	DC								
PVR1300	± 100	5.0	1.5	700		10^8		300/50		MR3	PVR  2 Form A
PVR1301	± 100	5.0	1.5	700		10^{10}		300/50			
PVR2300	± 200	24	6.0	260	10	10^8	1500	100/50	0.2		
PVR3300	± 300	24	6.0	260		10^8		100/50			
PVR3301	± 300	24	6.0	260		10^{10}		100/50			
PVA1052	± 100	35		70	5.0	10^8		25/15		MR1	PVA  1 Form A
PVA1054	± 100	35		70	5.0	10^{10}		25/15			
PVA1352	± 100	5.0		315	5.0	10^8		300/50			
PVA1354	± 100	5.0		315	5.0	10^{10}		300/50			
PVA2352	± 200	24		130	5.0	10^8	2500	100/50	0.2		
PVA3054	± 300	160		40	5.0	10^{10}		25/15			
PVA3055	± 300	160		40	5.0	10^{11}		25/15			
PVA3324	± 300	24		130	2.0	10^{10}		100/50			
PVA3354	± 300	24		130	5.0	10^{10}		100/50			
PVAZ172	± 60	0.5		1200	10	10^8	1500	500/8000			
PVD1052	± 100		8.0	160	5.0	10^8		25/15		MR1	PVD  1 Form A
PVD1054	± 100		8.0	160	5.0	10^{10}		25/15			
PVD1352	+100		1.5	500	5.0	10^8		300/50			
PVD1354	+100		1.5	500	5.0	10^{10}	2500	300/50	0.2		
PVD2352	+200		6.0	220	5.0	10^8		100/50			
PVD3354	+300		6.0	220	5.0	10^{10}		100/50			
PVDZ172	+60		0.25	1400	10	10^8	1500	500/8000			

Part Number	Number Outputs	Output Voltage V(DC)	Short Circuit Current μ A	Nom. Control Current (DC) mA	Dielectric Strength Input/Output V(RMS)	Case Outline No.	Series
PVI5100	1	5.0	10.0	10	2500	MR1	PVI 
PVI1050	2	5.0/10	10/5	10	2500		

Wiring Diagram

			
PVR	PVA	PVD	PVI

(1) Output for PVD and PVI Series is DC only all others are AC or DC

(2) For case outline drawing see page 147.




PIC Microelectronic Relays

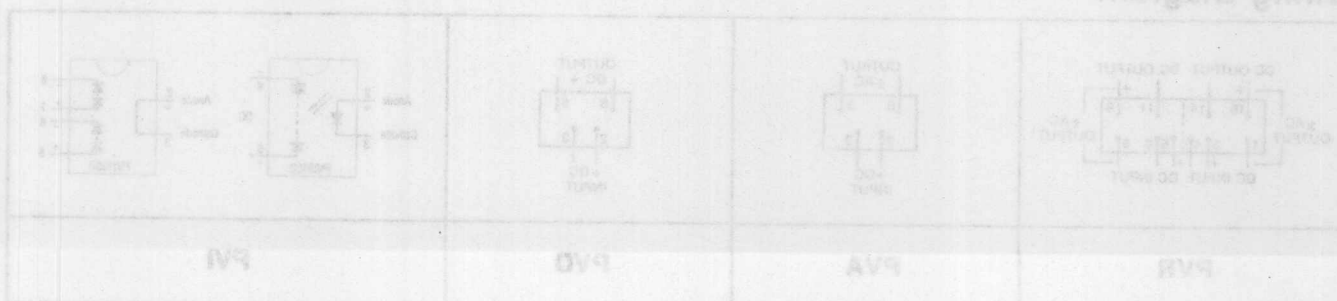
ChipSwitch® Solid State Relays

for AC Line Switching

Safety Standards Qualifications

International
IOR Rectifier

ChipSwitch Part No.						
	Underwriters Labs Recognition		Canadian Standards Certification		VDE-Prüfstelle Certification	
	Standard	File	Standard	File	Standard	File
SP1110	UL508	E50015	C22.2	Pending	VDE0883/6.80	53105
SP1210		E50015		Pending		53105
SP2110		E50015		Pending		53105
SP2210		E50015		Pending		53105
SP6110		E50015		Pending		53105
SP6210		E50015		Pending		53105
DP1110	UL508	E50015	C22.2	LR32053	VDE0883/6.80	53106
DP1210		E50015		LR32053		53106
DP1610		E50015		LR32053		53106
DP2110		E50015		LR32053		53106
DP2210		E50015		LR32053		53106
DP2610		E50015		LR32053		53106
DP6110		E50015		LR32053		53106
DP6210		E50015		LR32053		53106
DP6610		E50015		LR32053		53106
CS5005	UL508	E50015	C22.2	LR56615	VDE0883/6.80	55448
CS5010		E50015		LR56615		55448
CS6005		E50015		LR56615		55448
CS6010		E50015		LR56615		55448
PVA2352	UL508	E88583	—	—	—	—
PVA3324						
PVA3354						



Power Interface Products

HEXFET POWER MODULES Standard and Custom

International Rectifier's Power Interface Products Group offers state of the art packaging of complete power functions for a wide range of applications. These single in-line multi-chip modules reduce valuable board space occupied by power components, simplify circuit design, provide electrical isolation and thermal management, and minimize assembly costs.

The Power Interface Product's unique approach to power packaging has resulted in optimized use of Alumina Powerline and Insulated Metal Substrates (IMS) allowing for optimized thermal and electrical performance of IR's broad line of power components.

The Powerline and IMS packages that house IR's state of the art HEXFET's, IGBT's and IC's in common circuit configurations provide the circuit designer a variety of standard off-the-shelf products which simplify circuit design and effort. These packages are also available for your unique custom circuit configuration and are shown on the following pages.

For detailed information and technical assistance, contact your local sales office or International Rectifier's Power Interface Product Business Management Group.



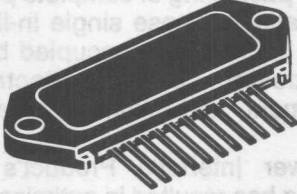
Power Interface Products

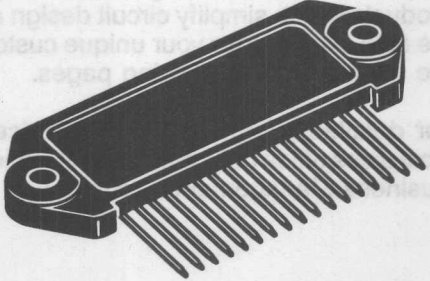
The Powerline and IMS Packages

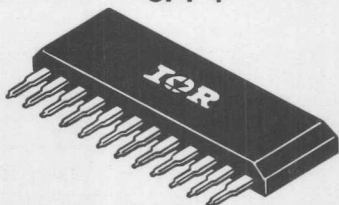
The Power Interface Products family are available in seven different package outlines. All seven are Single-In-Line Packages (SIP) printed circuit board compatible modules. The packages are the Powerline 1 and 2, CPT4, IMS-1 and IMS-2, and the SC-1 and SC-2 as shown below and on the opposite page. These packages are available with standard configurations as described

on page 20 and are also available for semi-custom design to meet your specific circuit requirements. They may include HEXFET's, IGBT's, Logic Level HEXFET's, IC's, resistors, capacitors, Diodes, (Schottky, Zener or FRED's) chips as well as surface mount components. Customer specified lead forming and terminations are also available.

Powerline Packages for standard or semi-custom designs.

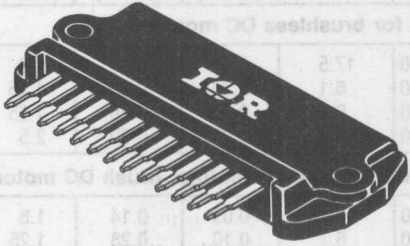
Max No. of Pins: 11 on 0.1" centers	Powerline 1  1.5" x 0.5" x 0.13" power SIP
Maximum Current: 10 Amps	
Power Range: 20 Watts to 100 Watts	
Circuit and Component Capability	
3 ϕ Bridge with HEX-2 Die and Diodes	
H Bridge with HEX-3 Die and Diodes	
1/2 Bridge with HEX-5 Die, Diodes, and Logic	
Typical Applications	
FHP Motors; Actuators; Power Amplifiers	

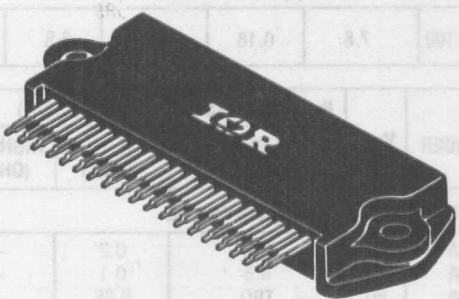
Max No. of Pins: 17 on 0.1" centers	Powerline 2  2.5" x 0.75" x 0.20" power SIP
Maximum Current: 20 Amps	
Power Range: 30 Watts to 200 Watts	
Circuit and Component Capability	
3 ϕ Bridge with HEX-3 Die and Diodes	
H Bridge with HEX-4 Die, Diodes, and Logic	
1/2 Bridge with HEX-6 Die, Diodes, and Logic	
Typical Applications	
FHP Motor Drives; Power Supplies	

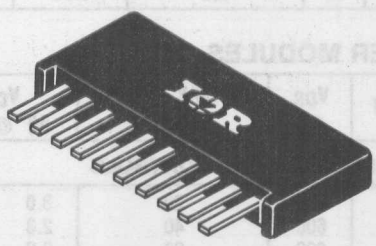
Max No. of Pins: 12	CPT 4 
Power Range: 2 watts to 3 watts	
Circuit and Component Capability	
Complimentary or N-Channel QUAD Switch HEX-4 Die	
Typical Applications	
Solenoid Drive, Motor controls	

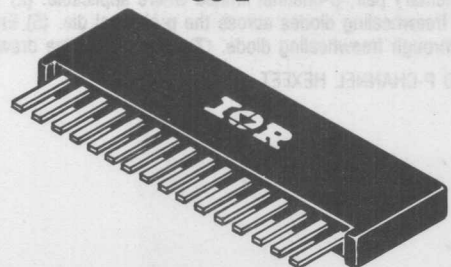
For case outline drawing see page 148.

Powerline Packages for standard and semi-custom designs.

Max No. of Pins: 13	IMS-1
Power Range: 20 Watts to 80 Watts	
Circuit and Component Capability	
3 ϕ Bridge with IGBT-2 Die and Diodes	
H-Bridge HEX-4 Die and Diodes	
Single Phase Leg with IGBT-5 Die and Diodes	
Typical Applications	
Power Supplies and Motor controls	

Max No. of Pins: 19	IMS-2
Power Range: 30 Watts to 125 Watts	
Circuit and Component Capability	
3 ϕ Bridge with IGBT-4 Die and Diodes	
H-Bridge HEX-6 Die and Diodes	
Single Phase Leg with IR2110, IGBT-4 Die and Diodes	
Typical Applications	
Power Supplies and Motor controls	

Max No. of Pins: 10	SC-1
Power Range: 20 Watts to 40 Watts	
Circuit and Component Capability	
Complimentary H bridge Low Voltage HEX-3 Die	
Available for Custom design	
Typical Applications	
Low Voltage Stepper and Motor Controls	

Max No. of Pins: 16	SC-2
Power Range: 20 Watts to 40 Watts	
Circuit and Component Capability	
Complimentary 3 ϕ Low Voltage HEX-3 Die	
Available for Custom design	
Typical Applications	
Low Voltage Stepper and Motor controls	

For case outline drawing see page 148.

HEXFET POWER MODULES

PART NUMBER	V _{DS} (V)	I _D MAX. (1) @ T _C = 45°C (AMPS)	MAX. R _{DS(ON)} PER SWITCH		V _{SD} (2) PER SWITCH		TYPICAL R _{THJC} (K/W)	CIRCUIT	CASE OUTLINE NUMBER (7)	NOTES	CASE STYLE
			LOW SIDE (OHMS)	HIGH SIDE (OHMS)	LOW SIDE (VOLTS)	HIGH SIDE (VOLTS)					

3 ϕ BRIDGES for brushless DC motors

CPU303A	60	17.5	0.05	0.05	1.6	1.6	3.8	A	CP3	8	IMS-1
IRFT002	60	6.1	0.10	0.28	1.25	-6.3	5.6	B	CP1	—	POWERLINE 1
CPY302F	60	6.1	0.10	0.28	1.25	1.5	5.6	C	CP1	(4)(6)	POWERLINE 1
IRFT001	100	3.6	0.30	0.60	2.5	-6.3	7.5	B	CP1	—	POWERLINE 1

FULL BRIDGES for stepper motors, brush DC motors, servo amplifiers, power supplies

CPY203E	60	10.1	0.05	0.14	1.6	1.5	5.6	D	CP1	(3)(4)(6)	POWERLINE 1
IRFT003	60	6.1	0.10	0.28	1.25	-6.3	3.8	E	CP1	—	POWERLINE 1
CPU234A	250	9.0	0.28	0.28	1.8	1.8	1.8	F	CP3	8	IMS-1
CPU254A	500	5.3	0.85	0.85	2.0	2.0	1.8	F	CP3	8	IMS-1
CPV256K	500	16.0	0.27	0.27	1.3	1.3	0.6	G	CP4	(5)(8)	IMS-2
CPV255K	500	10.5	0.40	0.40	1.4	1.4	1.0	G	CP4	(5)(8)	IMS-2

UNIPOLAR DRIVE for stepper motors, solenoid drives

CPY400H	100	7.8	0.18	—	2.5	1.5	5.3	H	CP1	(4)(6)	POWERLINE 1
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PART NUMBER	V _{DS} (V)	P _D MAX @ 25°C	R _{DS(ON)}		R _{thJA}	CIRCUIT	CASE OUTLINE NUMBER	NOTES	CASE STYLE
		PER DEVICE (W)	LOW SIDE (OHMS)	HIGH SIDE (OHMS)					

QUAD SWITCH N-CHANNEL HEXFETS

CPT401A	60	TBD	0.2	—	65.0	I	CP5	8	CPT4
CPT402A	60	4.5	0.1	—		I	CP5	8	CPT4
CPT403A	60	TBD	0.05	—		I	CP5	8	CPT4

QUAD SWITCH COMPLIMENTARY PAIR HEXFETS

CPT401Q	60	TBD	0.2	0.28	65.0	J	CP5	8	CPT4
CPT402Q	60	*2	0.1	0.28		J	CP5	8	CPT4
CPT403Q	60	TBD	0.05	0.14		J	CP5	8	CPT4

IGBT POWER MODULES

PART NUMBER	V _{DS} (V)	P _D MAX @ 25°C (W)	V _{CE} (V) @ (A)	CIRCUIT	CASE OUTLINE	NOTES	CASE STYLE
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3 ϕ BRIDGES FOR AC MOTOR CONTROLS

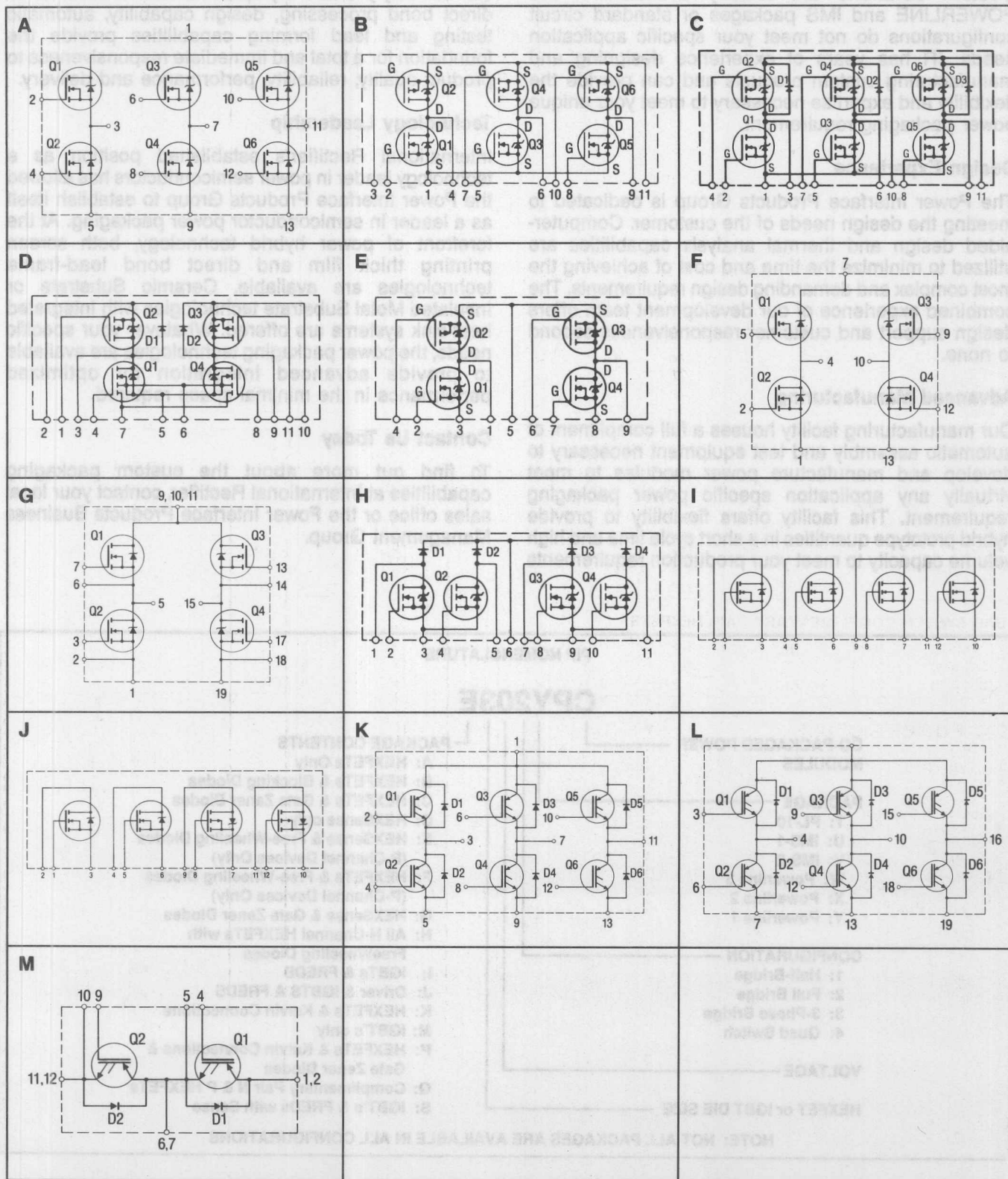
CPU362MF	600	20	3.0 9	K	CP3	8	IMS-1
CPV363MF	600	40	2.3 17	L	CP4	8	IMS-2
CPV364MF	600	60	2.2 27	L	CP4	8	IMS-2

HALF BRIDGES FOR AC MOTOR CONTROLS

CPU165MF	600	80	1.9 39	M	CP3	8	IMS-1
----------	-----	----	--------	---	-----	---	-------

(1) Complementary pair; p-channel limited where applicable. (2) Typical; consult the data sheet for conditions. (3) Contains HEXSense® current-sensing die. (4) Includes freewheeling diodes across the p-channel die. (5) Employs gate-source zener diodes for ESD protection. (6) VSD value given for reverse conduction through freewheeling diode. (7) For case outline drawing see page 148. (8) Preliminary data, contact factory for availability and specifications.

*LIMITED TO P-CHANNEL HEXFET



Custom Power Packaging

International
IOR Rectifier

Custom solutions are readily available if the POWERLINE and IMS packages or standard circuit configurations do not meet your specific application needs. IR has years of experience designing and manufacturing custom products and can provide the flexibility and expertise necessary to meet your unique power packaging requirement.

Design Experience

The Power Interface Products Group is dedicated to meeting the design needs of the customer. Computer-aided design and thermal analysis capabilities are utilized to minimize the time and cost of achieving the most complex and demanding design requirements. The combined experience of our development team offers design support and customer responsiveness second to none.

Advanced Manufacturing

Our manufacturing facility houses a full compliment of automatic assembly and test equipment necessary to develop and manufacture power modules to meet virtually any application specific power packaging requirement. This facility offers flexibility to provide hybrid prototype quantities in a short cycle time and high volume capacity to meet your production requirements

with delivery you can rely upon. Dedicated thick film or direct bond processing, design capability, automatic testing and lead forming capabilities provide the foundation for a total and immediate responsiveness to product quality, reliability, performance and delivery.

Technology Leadership

International Rectifier's established position as a technology leader in power semiconductors has allowed the Power Interface Products Group to establish itself as a leader in semiconductor power packaging. At the forefront of power hybrid technology, both screen printing thick film and direct bond lead-frame technologies are available. Ceramic Substrate or Insulated Metal Substrate technologies with integrated heat-sink systems are offered. Whatever your specific needs, the power packaging technologies are available to provide advanced integration for optimized performance in the minimal space required.

Contact Us Today

To find out more about the custom packaging capabilities at International Rectifier, contact your local sales office or the Power Interface Products Business Management Group.

PIP NOMENCLATURE

CPY203E

CO-PACKAGED POWER MODULES

PACKAGE

- T: PL-10
- U: IMS-1
- V: IMS-2
- W: Powerline 3
- X: Powerline 2
- Y: Powerline 1

CONFIGURATION

- 1: Half-Bridge
- 2: Full Bridge
- 3: 3-Phase Bridge
- 4: Quad Switch

VOLTAGE

HEXFET or IGBT DIE SIZE

PACKAGE CONTENTS

- A: HEXFETs Only
- B: HEXFETs & Blocking Diodes
- C: HEXFETs & Gate Zener Diodes
- D: HEXSense only
- E: HEXSense & Free-Wheeling Diodes (P-Channel Devices Only)
- F: HEXFETs & Free-Wheeling Diodes (P-Channel Devices Only)
- G: HEXSense & Gate Zener Diodes
- H: All N-Channel HEXFETs with FreeWheeling Diodes
- I: IGBTs & FREDs
- J: Driver & IGBTs & FREDs
- K: HEXFETs & Kelvin Connections
- M: IGBT's only
- P: HEXFETs & Kelvin Connections & Gate Zener Diodes
- Q: Complimentary Pair N & P HEXFETs
- S: IGBT's & FREDs with Sense

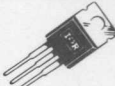
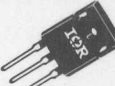
NOTE: NOT ALL PACKAGES ARE AVAILABLE IN ALL CONFIGURATIONS

(7) For case outline drawing see page 149.

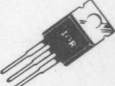
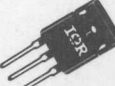
Insulated Gate Bipolar Transistor

**International
IOR Rectifier**

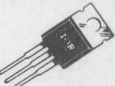
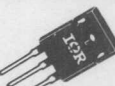
Standard-Speed IGBTs Applications: High Voltage Motor Controls, UPS

Part Number	BV _{CES} Collector to Emitter Breakdown Voltage (V)	V _{GE(th)} Gate to Emitter Threshold Voltage		V _{CE(on)} Collector to Emitter Saturation Voltage Max (V)	I _C Continuous Collector Current		E _{ts typ} Total Switching Loss @ T _J = 150°C V _{CC} = 480V		P _D Max. Power Dissip. (W)	Case Outline Number (1)	Notes	Case Style
		Min (V)	Max (V)		@ T _C = 25°C (A)	@ T _C = 100°C (A)	(mJ)	(A)				
IRGBC20S IRGBC30S IRGBC40S	600	3.0	5.5	2.0 1.9 1.8	19 34 50	10 18 31	4.1 7.1 13	10 18 31	60 100 160	IG1		TO-220AB 
IRGPC40S IRGPC50S				1.8 1.6	60 70	31 41	13 16	31 41	160 200	IG2		TO-247AC (TO-3P) 

Fast-Speed IGBTs Applications: High Voltage UPS's, Motor Control, Industrial

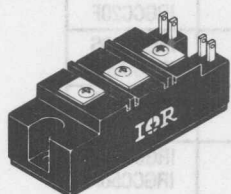
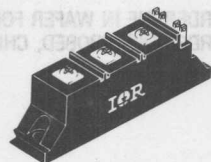
IRGBC20F IRGBC30F IRGBC40F	600	3.0	5.5	2.8 2.1 2.0	16 31 49	9 17 27	1.8 2.5 4.4	9 17 27	60 100 160	IG1		TO-220AB 
IRGBF20F				2.5	12	7	1.5	6	—			
IRGPC40F IRGPC50F	600	3.0	5.5	2.0 1.7	49 70	47 39	4.4 6.0	27 39	160 200	IG2		TO-247AC (TO-3P) 
IRGPF30F IRGPF40F IRGPF50F				2.5 2.5 2.5	24 42 56	13 23 31	3 5 10	12 20 40	— — —			
IRGPH40F IRGPH50F	1200	3.5	5.5	2.2 2.2	40 50	22 27	5 10	10 20	— —			

UltraFast™ IGBTs Applications: High Voltage SMPS's, Motor Controls, Robotics

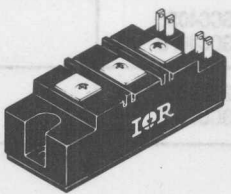
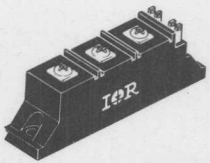
IRGBC20U IRGBC30U IRGBC40U	600	3.0	5.5	3.0 3.0 3.0	13 23 40	6.5 12 20	0.35 0.59 1.5	6.5 12 20	60 100 160	IG1		TO-220AB 
IRGPC40U IRGPC50U				3.0 3.0	40 55	20 27	1.5 1.7	20 27	160 200	IG2		TO-247AC (TO-3P) 

(1) For case outline drawing see page 149.

Fast-Speed IGBT Modules

Part Number	B _V CES Collector to Emitter Breakdown Voltage (V)	I _C Collector Current T _C = 25°C (A)	V _{CE(ON)} @ I _C Max	I _{LM} Clamped Inductive Load Current (A)	P _D Max. Power Dissip. Per Switch @ 25°C (W)	Max. ETS/A	Circuit Type	Case Outline Number (1)	Case Style		
IRGTI065F06 IRGTI120F06 IRGTI165F06 IRGTI200F06	600	65 120 165 200	2.3 2.2 2.1 2.0	130 240 330 400	179 298 379 500	3.0	Half Bridge	IG3	INT-A-Pak 		
IRGKI065F06 IRGKI120F06 IRGKI165F06 IRGKI200F06		65 120 165 200	2.3 2.2 2.1 2.0	130 240 330 400	179 298 379 500		Low Side Switch Chopper				
IRGNI065F06 IRGNI120F06 IRGNI165F06 IRGNI200F06		65 120 165 200	2.3 2.2 2.1 2.0	130 240 330 400	179 298 379 500		High Side Switch Chopper				
IRGTA050F06 IRGTA090F06		50 90	2.0 2.1	100 180	125 219		Half Bridge			IG4	ADD-A-Pak 
IRGKA050F06 IRGKA090F06 IRGKA120F06		50 90 120	2.0 2.1 2.0	100 180 240	125 219 278		Low Side Switch Chopper				
IRGNA050F06 IRGNA090F06 IRGNA120F06		50 90 120	2.0 2.1 2.0	100 180 240	125 219 278		High Side Switch Chopper				

UltraFast™ IGBT Modules

IRGTI050U06 IRGTI090U06 IRGTI115U06 IRGTI140U06	600	505 90 115 140	3.1 3.0 2.8 2.7	100 180 230 280	179 298 379 500	0.12	Half Bridge	IG3	INT-A-Pak 			
IRGKI050U06 IRGKI090U06 IRGKI115U06 IRGKI140U06		50 90 115 140	3.1 3.0 2.8 2.7	100 180 230 280	179 298 379 500		Low Side Switch Chopper					
IRGNI050U06 IRGNI090U06 IRGNI115U06 IRGNI140U06		50 90 115 140	3.1 3.0 2.8 2.7	100 180 230 280	179 298 379 500		High Side Switch Chopper					
IRGTA035U06 IRGTA065U06		35 65	3.0 2.9	70 130	125 202		0.12			Half Bridge	IG4	ADD-A-Pak 
IRGKA035U06 IRGKA065U06 IRGKA090U06		35 65 90	3.0 2.9 2.7	70 130 180	125 202 278					Low Side Switch Chopper		
IRGNA035U06 IRGNA065U06 IRGNA090U06		35 65 90	3.0 2.9 2.7	70 130 180	125 202 278					High Side Switch Chopper		

(1) For case outline drawing see page 150.

Insulated Gate Bipolar Transistor

**International
IOR Rectifier**

IGBT Die

Electrical Probe Specifications for IGBT Die

IGBT Die Size	Part Number (4)	Max. Rated V_{CE} (V)	$V_{GE(th)}$ @ $I_C = 250 \mu A$ $V_{CE} = 5V$ Min. (V)	$V_{GE(th)}$ @ $I_C = 250 \mu A$ $V_{CE} = 5V$ Max. (V)	$V_{CE(on)}$ $V_{GE} = 15V$ Max. (1) (V)	@ $I_C =$ (A)	I_{CES} @ Rated V_{CE} $V_{GE} = 0$ Max. (μA)	I_{GES} @ $V_{GE} =$ $\pm 20V$ Max. (nA)	Closest Packaged Device	Die Figure No. (3)
2	IRGCC20S IRGCC20F	600	3.0	5.5	2.0 2.8	10 9.0	250	500	IRGBC20S IRGBC20F	D49
3	IRGCC30S IRGCC30F				1.9 2.1	18 17			IRGBC30S IRGBC30F	D50
4	IRGCC40S IRGCC40F				1.8 2.0	31 27			IRGBC40S IRGBC40F	D51
5	IRGCC50S IRGCC50F				1.6 1.7	41 39			IRGPC50S IRGPC50F	D52

(1) PULSE TEST, 80 μs DUTY FACTOR < 0.1%

(2) FOR CASE OUTLINE DRAWING SEE PAGE 149.

(3) FOR DIE OUTLINE DRAWING SEE PAGE 149.

(4) TO ORDER DIE IN WAFER FORM, PROBED, UNCUT ADD B TO END OF PART NUMBER I.E. IRGCC20FB.
TO ORDER DIE, PROBED, CHIP PACK ADD D TO END OF PART NUMBER I.E. IRGCC20FD.

Part Number	# of Die Per Chip Pack
IRGCC20SD IRGCC20FD	96 96
IRGCC30SD IRGCC30FD	45 45
IRGCC40SD IRGCC40FD	35 35
IRGCC50SD IRGCC50FD	16 16

HEXFET


Power MOSFETs

If you have an application where your circuit enclosure and/or heat sink must be grounded for your internal circuitry and be isolated from the rest of the circuit, then the Fullpak line of HEXFETs is for you. With this line, some conductors were insulated from ground—heat sink with insulating wafer and nylon screws. Improper installation of insulating hardware caused failure which resulted in poor reliability which in turn led to higher manufacturing and servicing costs.

Fullpak HEXFETs allow you to mount directly to grounded metal work, eliminating the need for insulating hardware and without a significant change in thermal characteristics. The convenient TO-250 and TO-262 size packages provide the advantage for existing designs and equipment to be retrofitted without modification. The TO-250 Fullpak provides 2000 Vdc isolation (1800Vac, 60Hz) while containing only about 15pf (typ) from drain to heat sink. The TO-262 Fullpak provides 2000Vdc isolation (1800Vac, 60Hz).

See the tables below for the Fullpak to fit your needs.

Part Number	V _{DS} Drain-Source Voltage (Vdc)	r _{DS(on)} Drain-Source Resistance 25°C Case (mΩ)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 175°C Case (Amps)	R _{DS(on)} Drain-Source Resistance 175°C (mΩ)	P _D Max Power Dissipation (Watts)	Case Outline Number (C)	Notes	Case Style	
IRF524	50	0.40	14	9.7	4.1	37	HQA	(1)	SIMILAR TO-250AB TO-250AB	
IRF524	50	0.080	30	14	3.9	39				
IRF524	50	0.028	30	21	3.3	46				
IRF520	100	0.18	9.7	6.0	3.9	39				
IRF540	100	0.077	17	12	3.1	48				
IRF520	200	0.40	5.0	3.7	3.0	39				
IRF540	200	0.18	9.8	6.5	3.1	40				
IRF534	250	0.45	5.8	3.8	3.0	39				
IRF544	250	0.28	7.9	5.0	3.1	40				
IRF520	400	1.0	3.5	2.5	3.0	32	H82			
IRF540	400	0.55	5.4	3.4	3.1	40				
IRF520	600	2.0	2.1	1.8	4.1	30				
IRF540	600	1.5	3.1	2.0	3.9	32				
IRF540	600	0.65	4.8	2.9	3.1	40				



IRF524	50	0.058	43	35	1.8	100	H70	(1)	SIMILAR TO-247AC TO-247AC
IRF524	50	0.014	64	40	1.3	120			
IRF540	100	0.077	23	16	1.5	100			
IRF520	100	0.056	31	22	1.3	120			
IRF520	200	0.18	14	8.8	1.5	89			
IRF520	200	0.082	20	14	1.3	95			
IRF524	250	0.28	11	6.9	1.8	55			
IRF524	250	0.14	17	11	1.3	80			
IRF540	400	0.55	8	5.1	1.8	30			
IRF520	400	0.30	11	7.0	1.3	30			
IRF540	600	0.65	6.1	4.0	1.8	37			
IRF520	600	0.50	7.4	4.7	1.4	39			
IRF520	600	0.40	10	5.8	1.8	45			

(1) For lead formed options see page 124. (2) For case outline drawing see page 125.

FullPak Fully-isolated HEXFETs

International Rectifier is proud to introduce its FullPak line of fully-isolated power MOSFETs. Available in popular-sized package outlines, these devices are designed to provide ease of use, lower costs of assembly, and high reliability.

FullPak HEXFETs are fully-isolated versions of the popular TO-220 and TO-247 ("TO-3P") packages. The well-known benefits of HEXFET power MOSFETs include voltage control, fast switching, temperature stability, ease of paralleling, low on-state resistance, high transconductance, superior dv/dt and avalanche ruggedness, and a broad range of voltages and ratings. In addition, these devices provide the designer with a cost-saving applications in situations where electrical isolation is required.

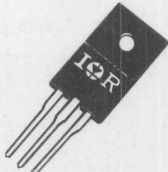
FullPak HEXFETs are excellent for use in a wide array of commercial applications in consumer, automotive, telecommunications, computer and industrial circuits (switching power supplies, amplifiers, and high-energy pulse circuits).

If you have an application where your circuit enclosure and/or heatsinks must be grounded (or your internal circuitry must be isolated from the heatsink/enclosure), then *the FullPak is for you*. Until now, semiconductors were insulated from grounded heatsinks with insulating washers and nylon screws. Improper installation of insulating hardware caused failures which resulted in poor reliability which in turn led to higher manufacturing and servicing costs.

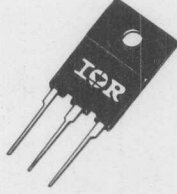
FullPak HEXFETs allow you to mount directly to grounded metal work, eliminating the need for insulating hardware and without a significant change in thermal characteristics. The convenient TO-220 and TO-3P size packages provide the advantage for existing designs and equipment to be retrofitted without modification! The TO-220 FullPak provides 2000 Vdc isolation (1500Vac, 60Hz) while contributing only about 12pF (typ.) from drain to heatsink. The TO-3P FullPak provides 4000Vdc isolation (2000Vac, 60Hz)

See the tables below for the FullPak to fit your needs!

Isolated TO-220

Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (2)	Notes	Case Style
IRFI224 IRFI234 IRFI244	60	0.10 0.050 0.028	14 20 30	9.7 14 21	4.1 3.9 3.1	37 38 48	H9A	(1)	ISO-TO-220 SIMILAR to TO-220AB 
IRFI530 IRFI540	100	0.16 0.077	9.7 17	6.9 12	3.9 3.1	39 48			
IRFI630 IRFI640	200	0.40 0.18	5.9 9.8	3.7 6.2	3.9 3.1	32 40			
IRFI634 IRFI644	250	0.45 0.28	5.6 7.9	3.5 5.0	3.9 3.1	32 40			
IRFI730 IRFI740	400	1.0 0.55	3.5 5.4	2.2 3.4	3.9 3.1	32 40	H9B		
IRFI820 IRFI830 IRFI840	500	3.0 1.5 0.85	2.1 3.1 4.6	1.3 2.0 2.9	4.1 3.9 3.1	30 32 40			

Isolated TO-247

IRFIP044 IRFIP054	60	0.028 0.014	43 64	30 45	1.5 1.3	100 120	H10	(1)	ISO-TO-3P SIMILAR to TO-247AC 
IRFIP140 IRFIP150	100	0.077 0.055	23 31	16 22	1.5 1.3	100 120			
IRFIP240 IRFIP250	200	0.18 0.085	14 22	8.9 14	1.5 1.3	83 96			
IRFIP244 IRFIP254	250	0.28 0.14	11 17	6.9 11	1.5 1.3	83 96			
IRFIP340 IRFIP350	400	0.55 0.30	8 11	5.1 7.0	1.5 1.3	83 96			
IRFIP440 IRFIP448 IRFIP450	500	0.85 0.60 0.40	6.4 7.4 10	4.0 4.7 6.5	1.5 1.4 1.3	83 89 96			

(1) For lead formed options see page 154.

(2) For case outline drawing see page 152.


Logic-Level HEXFETs

International Rectifier has expanded its line of Logic-Level HEXFETs to include the popular HEXDIP (4-pin plastic Dual-In-line) and surface-mountable D-Pak packages, as well as the original, ever-popular TO-220AB outline.


Logic-level HEXFETs feature the same basic characteristics as their well-established standard-gate counterparts — but instead of requiring

a full 10V from gate to source to turn on, logic-level HEXFETs require only 5V to achieve full enhancement. This allows direct interface between power loads and logic-IC level output signals — hence the name “logic-level.” This simplification of the gate drive requirement means significant cost savings, design simplification and higher reliability through the elimination of costly excess circuitry.


Surface Mount D-Pak (5 Volt Gate to Source)

Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (3)	Notes	Case Style
IRLR014 IRLR024	60	0.20 0.10	8.5 16	6.0 11	5.0 3.0	30 50	H1	(2)	TO-252AA D-Pak 
IRLR110 IRLR120	100	0.54 0.27	4.6 8.4	3.3 5.9	5.0 3.0	30 50			

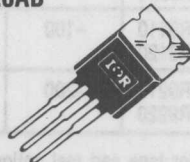
HEXDIP (5 Volt Gate to Source)

Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (3)	Notes	Case Style
IRLD014 IRLD024	60	0.20 0.10	1.7 2.5	1.2 1.8	— —	1 1	H4		HD-1 SIMILAR MO-001AN 
IRLD110 IRLD120	100	0.54 0.27	1.0 1.3	0.70 0.94	— —	1 1			

TO-251 I-Pak (5 Volt Gate to Source)

Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (3)	Notes	Case Style
IRLU014 IRLU024	60	0.20 0.10	8.5 16	6.0 11	5.0 3.0	30 50	H2		TO-251AA I-Pak 
IRLU110 IRLU120	100	0.54 0.27	4.6 8.4	3.3 5.9	5.0 3.0	30 50			

TO-220 (5 Volt Gate to Source)

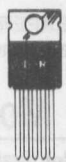
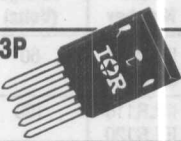
Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (3)	Notes	Case Style
IRLZ14 IRLZ24 IRLZ34 IRLZ44	60	0.20 0.10 0.050 0.028	10 17 30 50	7.2 12 21 36	3.5 2.5 1.7 1.0	43 60 88 150	H5	(1)	TO-220AB 
IRL510 IRL520 IRL530 IRL540	100	0.54 0.27 0.16 0.077	5.6 9.2 15 28	4.0 6.5 11 20	3.5 2.5 1.7 1.0	43 60 88 150			

(1) For lead formed options see page 154.



(2) For tape and reel options see page 152.

(3) For case outline drawing see page 152.

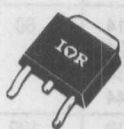
HEXSense Current Sensing N-Channel

(4) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25° Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Nominal Sense Ratio	Case Outline Number (3)	Case Style
IRCZ24 IRCZ34 IRCZ44	60	0.10 0.050 0.028	17 30 50	12 21 37	2.5 1.7 1.0	780 1410 2590	H6	5 PIN TO-220 SIMILAR to TO-204AA 
IRC530 IRC540	100	0.16 0.077	14 29	10 21	1.7 1.0	1465 2680		
IRC630 IRC640	200	0.40 0.18	9.0 18	5.7 11	1.7 1.0	1490 1495		
IRC634 IRC644	250	0.45 0.28	8.1 14	5.1 8.8	1.7 1.0	2740 2770		
IRC730 IRC740	400	1.0 0.55	5.5 10	3.5 6.3	1.7 1.0	1530 2800		
IRC830 IRC840	500	1.5 0.85	4.5 8.0	3.0 5.1	1.7 1.0	1520 2805		
IRCP054	60	0.014	70	* 70	0.50	2310	H8	5 PIN TO-3P SIMILAR to TO-247AC 

Surface Mount Devices N-Channel

(4) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (3)	Notes	Case Style
IRFS120	100	2.4	0.90	0.64	35	4	H3	(2)	TO-243AA SOT-89 
IRFR014 IRFR024	60	0.20 0.10	8.4 16	6.0 11	5.0 3.0	30 50	H1	(2)	TO-252AA D-Pak 
IRFR110 IRFR120	100	0.54 0.27	4.7 8.4	3.3 6.0	5.0 3.0	30 50			
IRFR210 IRFR220	200	1.5 0.8	2.6 4.8	1.7 3.0	5.0 3.0	25 42			
IRFR214 IRFR224	250	2.0 1.1	2.2 3.8	1.4 2.4	5.0 3.0	25 42			
IRFR310 IRFR320	400	3.6 1.8	1.7 3.1	1.1 2.0	5.0 3.0	25 42			
IRFR420	500	3.0	2.4	1.5	3.0	42			
IRFRC20	600	4.4	2.0	1.3	3.0	42			

Surface Mount Devices P-Channel


(4) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (3)	Notes	Case Style
IRFR9014 IRFR9024	-60	0.50 0.28	-5.6 -9.6	-3.9 -6.8	5.0 3.0	30 50	H1	(2)	TO-252AA D-Pak 
IRFR9110 IRFR9120	-100	1.2 0.60	-3.4 -6.3	-2.4 -4.5	5.0 3.0	30 50			
IRFR9210 IRFR9220	-200	3.0 1.5	-1.9 -3.6	-1.2 -2.3	5.0 3.0	25 42			

(2) For tape and reel options see page 152.


(3) For case outline drawing see page 152..

(4) Additional HEXFET part numbers are available: See numerical index page 191.

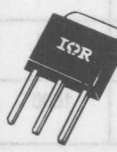
HEXDIP N-Channel

(2) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (1)	Notes	Case Style
IRFD014 IRFD024	60	0.20 0.10	1.7 2.5	1.2 1.80	— —	1.3 1.3	H4		HD-1 SIMILAR to MO-001AN 
IRFD120 IRFD110 IRFD120	100	2.4 0.54 0.27	0.50 1.0 1.3	0.36 0.71 0.94	— — —	1.3 1.3 1.3			
IRFD210 IRFD220	200	1.5 0.80	0.60 0.80	0.38 0.50	— —	1.0 1.0			


HEXDIP P-Channel

(2) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (1)	Notes	Case Style
IRFD9014 IRFD9024	-60	0.50 0.28	-1.1 -1.6	-0.80 -1.10	— —	1.3 1.3	H4		HD-1 SIMILAR to MO-001AN 
IRFD9110 IRFD9120	-100	1.2 0.60	-0.70 -1.0	-0.49 -0.70	— —	1.3 1.3			
IRFD9210 IRFD9220	-200	3.0 1.5	-0.40 -0.56	-0.25 -0.36	— —	1.0 1.0			

TO-251 N-Channel

(2) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (1)	Notes	Case Style
IRFU014 IRFU024	60	0.20 0.10	8.4 16	6.0 11	5.0 3.0	30 50	H2		TO-251AA I-Pak 
IRFU110 IRFU120	100	0.54 0.27	4.7 8.4	3.3 6.0	5.0 3.0	30 50			
IRFU210 IRFU220	200	1.5 0.80	2.6 4.8	1.7 3.0	5.0 3.0	25 42			
IRFU214 IRFU224	250	2.0 1.1	2.2 3.8	1.4 2.4	5.0 3.0	25 42			
IRFU310 IRFU320	400	3.6 1.8	1.7 3.1	1.1 2.0	5.0 3.0	25 42			
IRFU420	500	3.0	2.4	1.5	3.0	42			
IRFUC20	600	4.4	2.0	1.3	3.0	42			

TO-251 P-Channel

(2) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (1)	Notes	Case Style
IRFU9014 IRFU9024	-60	0.50 0.28	-5.6 -9.6	-3.9 -6.8	5.0 3.0	30 50	H2		TO-251AA I-Pak 
IRFU9110 IRFU9120	-100	1.2 0.60	-3.4 -6.3	-2.4 -4.5	5.0 3.0	30 50			
IRFU9210 IRFU9220	-200	3.0 1.5	-2.0 -3.6	-1.2 -2.3	5.0 3.0	25 42			

(1) For case outline drawing see page 152.

(2) Additional HEXFET part numbers are available: See numerical index page 191.

TO-220 N-Channel

(3) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (2)	Notes	Case Style
IRFZ14 IRFZ24 IRFZ34 IRFZ44 IRFZ48	60	0.20 0.10 0.050 0.028 0.018	10 17 30 50 50	7.2 12 21 46 50	3.5 2.5 1.7 0.60 0.60	43 60 88 250 250	H5	(1)	TO-220AB
IRF510 IRF520 IRF530 IRF540	100	0.54 0.27 0.16 0.077	5.6 9.2 14 28	4.0 6.5 10 20	3.5 2.5 1.7 1.0	43 60 88 150			
IRF610 IRF620 IRF630 IRF640	200	1.5 0.80 0.40 0.18	3.3 5.2 9.0 18	2.1 3.3 5.7 11	3.5 2.5 1.7 1.0	36 50 74 125			
IRF614 IRF624 IRF634 IRF644	250	2.0 1.1 0.45 0.28	2.7 4.4 8.1 14	1.7 2.8 5.1 8.8	3.5 2.5 1.7 1.0	36 50 74 125			
IRF710 IRF720 IRF730 IRF740	400	3.6 1.8 1.0 0.55	2.0 3.3 5.5 10	1.2 2.1 3.5 6.3	3.5 2.5 1.7 1.0	36 50 74 125			
IRF820 IRF830 IRF840	500	3.0 1.5 0.85	2.5 4.5 8.0	1.6 2.9 5.1	2.5 1.7 1.0	50 74 125			
IRFBC20 IRFBC30 IRFBC40	600	4.4 2.2 1.2	2.2 3.6 6.2	1.4 2.3 3.9	2.5 1.7 1.0	50 74 125			
IRFBE20 IRFBE30	800	6.5 3.0	2.0 5.2	1.2 3.3	2.0 0.60	63 210			
IRFBF20 IRFBF30	900	8.0 3.7	1.8 4.7	1.1 3.0	2.0 0.60	63 210			
IRFBG20 IRFBG30	1000	11.5 5.0	1.3 4.0	0.800 2.5	2.5 0.60	50 210			



TO-220 P-Channel

IRF9Z14 IRF9Z24 IRF9Z34	-60	0.50 0.28 0.14	-6.7 -11 -18	-4.7 -7.7 -13	3.5 2.5 1.7	43 60 88	H5	(1)	TO-220AB
IRF9510 IRF9520 IRF9530 IRF9540	-100	1.21 0.60 0.30 0.20	-4.0 -6.8 -12 -19	-2.8 -4.8 -8.2 -13	3.5 2.5 1.7 1.0	43 60 88 150			
IRF9610 IRF9620 IRF9630 IRF9640	-200	3.0 1.51 0.80 0.50	-1.7 -3.5 -6.5 -11	-1.0 -2.0 -4.0 -6.8	3.5 3.1 1.7 1.0	20 40 75 125			



(1) For lead formed options see page 154.

(2) For case outline drawing see page 152.

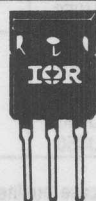
(3) Additional HEXFET part numbers are available: See numerical index page 191.

T0-247 N-Channel

(3) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (2)	Notes	Case Style
IRFP044 IRFP054 IRFP064	60	0.028 0.014 0.009	57 70 70	40 70 70	0.83 0.50 0.30	180 300 500	H7	(1)	T0-247AC T0-3P
IRFP140 IRFP150	100	0.077 0.055	31 47	22 33	0.83 0.50	180 300			
IRFP240 IRFP250 IRFP260	200	0.18 0.085 0.070	20 34 38	12 21 24	0.83 0.50 0.50	150 250 250			
IRFP244 IRFP254 IRFP264	250	0.28 0.14 0.095	15 26 32	9.7 17 20	0.83 0.50 0.50	150 250 250			
IRFP340 IRFP350 IRFP360	400	0.55 0.30 0.20	11 18 28	6.9 11 18	0.83 0.50 0.30	150 250 410			
IRFP440 IRFP448 IRFP450 IRFP460	500	0.85 0.60 0.40 0.27	8.8 11 16 25	5.6 6.6 9.9 16	0.83 0.70 0.50 0.30	150 180 250 410			
IRFPC30 IRFPC40 IRFPC50	600	2.2 1.2 0.60	4.3 6.8 13	2.7 4.3 8.0	1.2 0.83 0.50	100 150 250			
IRFPE30 IRFPE40 IRFPE50	800	3.0 2.0 1.2	5.2 6.9 11	3.3 4.4 6.7	0.60 0.50 0.35	210 250 360			
IRFPF30 IRFPF40 IRFPF50	900	3.7 2.5 1.6	4.7 4.7 9.1	3.0 3.0 5.8	0.60 0.83 0.35	210 150 360			
IRFPG30 IRFPG40 IRFPG50	1000	5.0 3.5 2.0	4.0 4.3 8.2	2.5 2.7 5.2	0.60 0.83 0.35	210 150 360			


T0-247 P-Channel

Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _D Continuous Drain Current 100°C Case (Amps)	R _{thJC} Max Thermal Resistance (°C/W)	P _D Max Power Dissipation (Watts)	Case Outline Number (2)	Notes	Case Style
IRFP9140 IRFP9240	-100 -200	0.20 0.50	-21 -12	-15 -7.5	0.83 0.83	180 150	H7	(1)	T0-247AC T0-3P

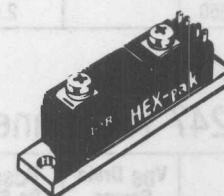
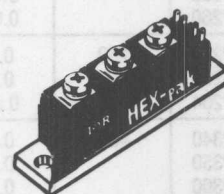


- (1) For lead formed options see page 154.
(2) For case outline drawing see page 152.

(3) Additional HEXFET part numbers are available: See numerical index page 191.

TO-240 N-Channel

(4) Part Number	V_{DS} Drain Source Voltage (Volts)	$R_{DS(on)}$ On-State Resistance (Ohms)	I_D Continuous Drain Current 25°C Case (Amps)	I_{DM} Pulse Drain Current (Amps)	P_D Max Power Dissipation (Watts)	Case Outline Number (1)	Notes	Case Style
IRFK2D054	60	0.010	120	480	500	H12	(2)	TO-240AA Half Bridge
IRFK2D150	100	0.028	72	288				
IRFK2D250	200	0.043	54	216				
IRFK2D350	400	0.15	25	100				
IRFK2D450	500	0.20	22	88				
IRFK2DC50	600	0.35	18	72				
IRFK2DE50	800	0.60	12	48				
IRFK2F054	60	0.010	120	480			(3)	
IRFK2F150	100	0.028	72	288				
IRFK2F250	200	0.043	54	216				
IRFK2F350	400	0.150	25	100				
IRFK2F450	500	0.20	22	88				
IRFK2FC50	600	0.35	16	72				
IRFK2FE50	800	0.60	12	48				
IRFK3D150	100	0.020	125	435	625	H11	(2)	TO-240AA Parallel Chip
IRFK3D250	200	0.030	70	280				
IRFK3D350	400	0.10	37	148				
IRFK3D450	500	0.135	33	132				
IRFK3DC50	600	0.23	24	96				
IRFK3F150	100	0.020	125	435			(3)	
IRFK3F250	200	0.030	70	280				
IRFK3F350	400	0.10	37	148				
IRFK3F450	500	0.135	33	132				
IRFK3FC50	600	0.23	24	96				
IRFK4H054	60	0.005	150	960	500		(2)	
IRFK4H150	100	0.014	137	548				
IRFK4H250	200	0.021	108	432				
IRFK4H350	400	0.075	50	200				
IRFK4H450	500	0.10	44	176				
IRFK4HC50	600	0.175	35	140				
IRFK4HE50	800	0.30	26	104				
IRFK4J054	60	0.005	150	960			(3)	
IRFK4J150	100	0.014	137	548				
IRFK4J250	200	0.021	108	432				
IRFK4J350	400	0.075	50	200				
IRFK4J450	500	0.10	44	176				
IRFK4JC50	600	0.175	35	140				
IRFK4JE50	800	0.30	26	104				
IRFK6H150	100	0.010	150	720	625		(2)	
IRFK6H250	200	0.015	140	560				
IRFK6H350	400	0.050	75	300				
IRFK6H450	500	0.067	66	264				
IRFK6HC50	600	0.10	48	192				
IRFK6J150	100	0.010	150	720			(3)	
IRFK6J250	200	0.015	140	560				
IRFK6J350	400	0.050	75	300				
IRFK6J450	500	0.067	66	264				
IRFK6JC50	600	0.10	48	192				




(1) For case outline drawing see page 152.

(2) Standard parts.


(3) Extra damped parts

(4) Additional HEXFET part numbers are available: See numerical index page 191.

TO-39 N-Channel

(5) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25° Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Case Outline Number (4)	Notes	Case Style
2N6782 IRFF110 2N6788 IRFF120 2N6796 IRFF130	100	0.60 0.60 0.30 0.30 0.18 0.18	3.5 3.5 6.0 6.0 8.0 8.0	14 14 24 24 32 32	15 15 20 20 25 25	H13	(3) (3) (3)	TO-205AF TO-39 
2N6784 IRFF210 2N6790 IRFF220 2N6798 IRFF230	200	1.5 1.5 0.80 0.80 0.40 0.40	2.25 2.2 3.5 3.5 5.5 5.5	9.0 9.0 14 14 22 22	15 15 20 20 25 25		(3) (3) (3)	
2N6786 IRFF310 2N6792 IRFF320 2N6800 IRFF330	400	3.6 3.6 1.8 1.8 1.0 1.0	1.25 1.35 2.5 2.5 3.0 3.5	5.5 5.5 10 10 14 14	15 15 20 20 25 25		(3) (3) (3)	
2N6794 IRFF420 2N6802 IRFF430	500	3.0 3.0 1.5 1.5	1.5 1.6 2.5 2.8	6.5 6.5 11 11	20 20 25 25		(3) (3)	

TO-39 P-Channel

(5) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25° Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Case Outline Number (4)	Notes	Case Style
IRFF9110 2N6845 IRFF9120 2N6849 IRFF9130	-100	1.2 0.60 0.60 0.30 0.30	-2.6 -4.0 -3.5 -6.5 -6.5	-10 -16 -14 -26 -26	15 20 20 25 25	H13	(3) (3)	TO-205AF TO-39 
IRFF9210 2N6847 IRFF9220 2N6851 IRFF9230	-200	3.0 1.5 1.5 0.80 0.80	-1.6 -2.5 -2.5 -4.0 -4.0	-6.5 -10 -10 -16 -16	15 20 20 25 25		(3) (3)	

(3) Mil Qualified HEXFET available, see Government/Space section page 117.

(4) For case outline drawing see page 152.

(5) Additional HEXFET part numbers are available: See numerical index page 191.

TO-3 N-Channel

(6) Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25° Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Case Outline Number (5)	Notes	Case Style
IRF024 IRF034 IRF044 IRF054	60	0.10 0.050 0.028 0.014	17 30 30 30	68 120 210 320	60 90 150 180	H18	(4)	TO-204AA TO-3
IRF120 2N6756 IRF130	100	0.27 0.18 0.16	9.2 14 14	37 56 56	60 75 79	H17	(3)	
IRF140 2N6764 IRF150		0.077 0.055 0.055	28 30 30	110 160 150	150 150 180	H18	(3)	
IRF220 2N6758 IRF230	200	0.8 0.60 0.40	5.0 9.0 9.0	20 36 36	40 75 73	H17	(3)	
IRF240 2N6766 IRF250		0.18 0.085 0.085	18 30 30	72 120 120	125 150 150	H18	(3)	
IRF234 IRF244 IRF254	250	0.45 0.28 0.14	8.4 14 22	34 56 88	74 125 150	H17 H18		
IRF320 2N6760 IRF330 IRF340 2N6768 IRF350 IRF360	400	1.8 1.0 1.0 0.55 0.30 0.30 0.20	3.3 5.5 5.5 10 15 14 25	13 20 20 40 60 25 100	50 75 75 125 150 150 300	H17 H18	(3) (3) (4)	
IRF420 2N6762 IRF430 IRF440 IRF448 2N6770 IRF450 IRF460	500	3.0 1.5 1.5 0.85 0.60 0.40 0.40 0.27	2.5 4.5 4.5 8.0 9.6 12 13 21	8.0 7.0 15 32 38 25 52 84	50 75 75 125 130 150 150 300	H17 H18	(3) (3) (4)	
IRFAC30 IRFAC40 IRFAC50	600	2.2 1.2 0.58	3.6 6.2 10.6	14 25 42.4	74 125 150	H17		
IRFAE20 IRFAE30 IRFAE40 IRFAE50	800	3.2 3.20 2.00 1.20	3.1 3.1 4.8 7.1	12 12 19 28	74 74 125 150			
IRFAF20 IRFAF30 IRFAF40 IRFAF50	900	8.0 4.0 2.5 1.6	1.6 2.8 4.3 6.2	6.4 11 17 25	50 74 125 150			
IRFAG20 IRFAG30 IRFAG40 IRFAG50	1000	11.5 5.6 3.5 2.0	1.3 2.3 3.9 5.6	5.2 9.2 16 22	50 74 125 150			



TO-3 P-Channel

2N6804 IRF9130 IRF9140	-100	0.30 0.30 0.20	-11 -12 -19	-50 -48 -76	75 88 125	H17	(3)	TO-204AA TO-3
2N6806 IRF9230 IRF9240	-200	0.80 0.80 0.50	-6.5 -6.5 -11	-26 -26 -44	75 75 125		(3)	



(3) Mil Qualified HEXFET available, see Government/Space section page 117.

(5) For case outline section drawing see page 152.

(4) TO-204AE case style.

(6) Additional HEXFET part numbers are available: See numerical index page 191.

HEXFET III Die

HEX Size	Part Number	VDS	RDS(on) Max.	Figure	Recomm. Source Bonding Wire		Data Sheet
					mils	mm	
Z	IRFC1Z0	100	2.400	1	3	0.08	PD-9.438
1	IRFC014	60	0.200	2	5	0.13	PD-9.507
1	IRFC110	100	0.540	3	5	0.13	PD-9.325
1	IRFC210	200	1.500	4	5	0.13	PD-9.326
1	IRFC214	250	2.000	4	5	0.13	PD-9.475
1	IRFC310	400	3.600	5	5	0.13	PD-9.327
2	IRFC024	60	0.100	6	10	0.25	PD-9.594
2	IRFC120	100	0.270	8	8	0.20	PD-9.313
2	IRFC220	200	0.800	9	8	0.20	PD-9.317
2	IRFC224	250	1.100	9	8	0.20	PD-9.472
2	IRFC320	400	1.800	10	8	0.20	PD-9.315
2	IRFC420	500	3.000	10	8	0.20	PD-9.324
2	IRFCC20	600	4.400	10	8	0.20	PD-9.623
2	IRFCE20	800	6.500	11	5	0.13	PD-9.610
2	IRFCF20	900	8.000	11	5	0.13	PD-9.607
2	IRFCG20	1000	11.500	11	5	0.13	PD-9.604
3	IRFC034	60	0.050	12	15	0.38	PD-9.509
3	IRFC130	100	0.160	14	10	0.25	PD-9.307
3	IRFC230	200	0.400	16	8	0.20	PD-9.309
3	IRFC234	250	0.450	16	8	0.20	PD-9.476
3	IRFC330	400	1.000	17	8	0.20	PD-9.308
3	IRFC430	500	1.500	17	8	0.20	PD-9.311
3	IRFCC30	600	2.200	17	8	0.20	PD-9.482
3	IRFCE30	800	3.200	18	10	0.25	PD-9.613
3	IRFCF30	900	4.000	18	10	0.25	PD-9.616
3	IRFCG30	1000	5.600	18	10	0.25	PD-9.620
4	IRFC044	60	0.028	19	20	0.51	PD-9.510
4	IRFC140	100	0.077	21	15	0.38	PD-9.373
4	IRFC240	200	0.180	23	15	0.38	PD-9.374
4	IRFC244	250	0.280	23	15	0.38	PD-9.527
4	IRFC340	400	0.550	24	12	0.30	PD-9.375
4	IRFC440	500	0.850	24	12	0.30	PD-9.376
4.5	IRFC448	500	0.600	25	12	0.30	PD-9.595
4	IRFCC40	600	1.200	24	12	0.30	PD-9.506
4	IRFCE40	800	2.000	26	10	0.25	PD-9.578
4	IRFCF40	900	2.500	26	10	0.25	PD-9.580
4	IRFCG40	1000	3.500	26	10	0.25	PD-9.576
5	IRFC054	60	0.014	27	25	0.64	PD-9.544
5	IRFC150	100	0.055	29	20	0.51	PD-9.441
5	IRFC250	200	0.085	29	20	0.51	PD-9.443
5	IRFC254	250	0.140	29	20	0.51	PD-9.540
5	IRFC350	400	0.300	31	20	0.51	PD-9.445
5	IRFC450	500	0.400	31	20	0.51	PD-9.458
5	IRFCC50	600	0.600	31	20	0.51	PD-9.656
5	IRFCE50	800	1.200	32	10	0.25	PD-9.573
5	IRFCF50	900	1.600	32	10	0.25	PD-9.542
5	IRFCG50	1000	2.000	32	10	0.25	PD-9.543
6	IRFC260	200	(.060)	33	25	0.64	—
6	IRFC360	400	0.200	33	25	0.64	PD-9.518
6	IRFC460	500	0.270	33	25	0.64	PD-9.465

HEXFET III Die (Continued)

HEX Size	Part Number	VDS	RDS(on) Max.	Figure	Recomm. Source Bonding Wire		Data Sheet
					mils	mm	
P-CHANNEL HEXFETs							
1	IRFC9014	-60	0.500	2	5	0.13	PD-9.654
1	IRFC9110	-100	1.200	34	5	0.13	PD-9.390
1	IRFC9210*	-200	3.000	35	5	0.13	PD-9.350
2	IRFC9024	-60	0.280	6	10	0.25	PD-9.647
2	IRFC9120	-100	0.600	36	8	0.20	PD-9.319
2	IRFC9220*	-200	1.500	37	8	0.20	PD-9.351
3	IRFC9034	-60	0.140	12	12	0.30	PD-9.648
3	IRFC9130	-100	0.300	38	10	0.25	PD-9.320
3	IRFC9230	-200	0.800	16	8	0.20	PD-9.352
4	IRFC9044	-60	—	19	20	0.51	—
4	IRFC9140	-100	0.200	21	15	0.38	PD-9.421
4	IRFC9240	-200	0.500	23	15	0.38	PD-9.422
LOGIC LEVEL DIE							
1	IRLC014	60	0.200	2	5	0.13	PD-9.556
1	IRLC110	100	0.540	3	5	0.13	PD-9.560
2	IRLC024	60	0.100	6	10	0.25	PD-9.557
2	IRLC120	100	0.270	8	8	0.20	PD-9.561
3	IRLC034	60	0.050	12	15	0.38	PD-9.558
3	IRLC130	100	0.160	14	10	0.25	PD-9.562
4	IRLC044	60	0.028	19	20	0.51	PD-9.559
4	IRLC140	100	0.077	21	15	0.38	PD-9.563

HEX Size	Part Number	VDS	RDS(on) Max.	Nominal Sense Ratio	Figure	Recomm. Source Bonding Wire		Data Sheet
						mils	mm	
HEXSense DIE								
2	IRCC024	60	0.100	780	7	10	0.25	PD-9.615
3	IRCC034	60	0.050	1410	13	15	0.38	PD-9.590
3	IRCC130	100	0.160	1430	15	10	0.25	PD-9.454
3	IRCC230	200	0.400	1490	15	8	0.20	PD-9.565
3	IRCC234	250	0.450	1490	15	8	0.20	PD-9.566
3	IRCC330	400	1.000	1525	15	8	0.20	PD-9.567
3	IRCC430	500	1.500	1520	15	8	0.20	PD-9.455
4	IRCC044	60	0.028	2590	20	20	0.51	PD-9.529
4	IRCC140	100	0.077	2680	22	15	0.38	PD-9.592
4	IRCC240	200	0.180	2740	22	15	0.38	PD-9.568
4	IRCC244	250	0.280	2770	22	15	0.38	PD-9.569
4	IRCC340	400	0.550	2800	22	12	0.30	PD-9.570
4	IRCC440	500	0.850	2780	22	12	0.30	PD-9.593
5	IRCC054	60	0.014	2200	28	25	0.64	—
5	IRCC150	100	0.055	(5440)	30	20	0.51	—
5	IRCC250	200	0.085	(5680)	30	20	0.51	—
5	IRCC254	250	0.140	(5440)	30	20	0.51	—
5	IRCC350	400	0.300	(5440)	30	20	0.51	—
5	IRCC450	500	0.400	(5440)	30	20	0.51	—

*GEN I design

Numbers in parenthesis are preliminary.

For more detailed information, please refer to the most current data sheet.

Common characteristics:

I_{DSS} @ V_{DS} : 250 μ A

I_{GSS} : 500 nA

$V_{GS(th)}$: Standard HEXFETs min 2V, max 4V with $V_{DS} = V_{GS}$, $I_D = 250 \mu$ A

$V_{GS(th)}$: Logic level HEXFETs min 1V, max 2V with $V_{DS} = V_{GS}$, $I_D = 250 \mu$ A

$R_{DS(on)}$: Measured with $V_{GS} = 10V$ on standard HEXFETs and 5V on logic level HEXFETs

Recommended wire size for Gate, Kelvin and Current Sense Connections: 3 to 5 mils (0.076 to 0.127 mm)

Section


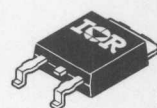
Schottky Rectifiers

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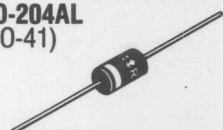
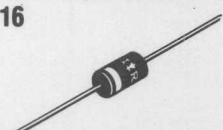
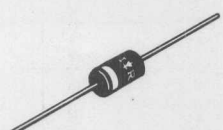
Schottky Rectifiers

Surface Mount

International
IOR Rectifier

Part Number	VRRM (V)	IF(AV) @ TC		VFM @ IFM (1) (V)	EAS (mJ)	IAR (A)	IRM @ Rated VRWM (1) (mA)	Max. TJ (°C)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)								
10MQ040	40	1.1	92	0.51	—	—	50	125	J1	(5)	D-64 (5) 
10MQ060	60	0.77	110	0.57	—	—	7.5				
10MQ090	90	0.77	110	0.65	—	—	5.0				
15MQ040	40	1.7		0.55	—	—	50			(1A)	
30WQ03F	30	3.3	105	0.56	—	—	12	125	J5	(5)	TO-252AA (D-PAK) 
30WQ04F	40	3.3	105	0.56			12				
30WQ05F	50	3.3	104	0.60			20				
30WQ06F	60	3.3	104	0.60			20				
30WQ09F	90	3.3	103	0.74			2				
30WQ10F	100	3.3	103	0.74			2				
50WQ03F	30	5.5	92	0.60	—	—	20	125			
50WQ04F	40	5.5	92	0.60			20				
50WQ05F	50	5.5	89	0.66			30				
50WQ06F	60	5.5	89	0.66			30				
50WQ09F	90	5.5	90	0.77			3				
50WQ10F	100	5.5	90	0.77			3				
6CWQ03F	30	6.6	97	0.63	—	—	20	125	K1	(5)	
6CWQ04F	40	6.6	97	0.63			20				
6CWQ05F	50	6.6	92	0.67			30				
6CWQ06F	60	6.6	92	0.67			30				
6CWQ09F	90	6.6	94	0.79			3				
6CWQ10F	100	6.6	94	0.79			3				

Discrete

Part Number	VRRM (V)	IF(AV) @ TC		VFM @ IFM (1) (V)	EAS (2) (mJ)	IAR (3) (A)	IRM @ Rated VRWM (1) (mA)	Max. TJ (°C)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)								
11DQ03	30	1.1	58	0.50	—	—	6	125	J2	(5)	DO-204AL (DO-41) 
11DQ04	40	1.1	58	0.50			6				
11DQ05	50	1.1	40	0.53			11				
11DQ06	60	1.1	40	0.53			11				
11DQ09	90	1.1	48	0.68			1				
11DQ10	100	1.1	48	0.68			1				
31DQ03	30	3.3	35	0.51	—	—	25	125	J3	(5)	C-16 
31DQ04	40	3.3	35	0.51			25				
31DQ05	50	3.3	19	0.53			30				
31DQ06	60	3.3	19	0.53			30				
31DQ09	90	3.3	25	0.69			4				
31DQ10	100	3.3	25	0.69			4				
50SQ080	80	5	119	0.52	15	1	7	175	J4		DO-204AR 
50SQ100	100	5	119	0.52			7	175			
80SQ035	35				10	1.6					
80SQ040	40	8	119	0.44			15	175			
80SQ045	45										
90SQ035	35				12	1.8					
90SQ040	40	9	69	0.42			70	150			
90SQ045	45										
95SQ015	15	9	55	0.25	4.5	1	348	100		(1B)(3A)	

(1) TJ = 125°C unless otherwise specified (see Notes column).

(2) TJ = 25°C, IAS = IAR.

(3) Current decaying linearly to zero in 1 μsec.

Frequency limited by TJ max. VA = 1.5 x VR typical unless otherwise specified (see Notes column).

(4) For case outline drawing see page 160.

(5) For tape and reel specifications see pages 164-166.

(1A) For VFM: TJ = 25°C; for IRM: TJ = 125°C.

(1B) For VFM: TJ = 75°C; for IRM: TJ = 100°C.

(1D) For VFM: TJ = 70°C; for IRM: TJ = 125°C.

(1E) For VFM: TJ = 25°C; for IRM: TJ = 125°C.

(1F) For VFM: TJ = 25°C; for IRM: TJ = 125°C.

(1G) VFM rated at 50A.

(1H) VFM rated at 80A.

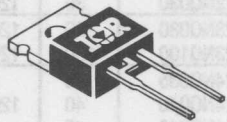


(1J) VFM rated at 160A.

(3A) Current decaying linearly to zero in 1 μsec.

Frequency limited by TJ max. VA = 3 x VR typical.

(3B) Current decaying linearly to zero in 2 μsec.

Frequency limited by TJ max. VA = 1.5 x VR typical.

Part Number	VRRM (V)	IF(AV) @ Tc		VFM @ IFM (1) (V)	EAS (2) (mJ)	IAR (3) (A)	IRM @ Rated VRWM (1) (mA)	Max. TJ (°C)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)								
6TQ035 6TQ040 6TQ045	35 40 45	6	163	0.51	8	1.2	7	175	J6		TO-220AC 
MBR735 MBR745	35 45	7.5	120	0.57	—	1.0	15	150		(3B)	
8TQ080 8TQ100	80 100	8	157	0.58	7.5	0.5	7	175			
MBR1035 MBR1045	35 45	10	120	0.57	—	1.0	15	150		(3B)	
10TQ035 10TQ040 10TQ045	35 40 45	10	151	0.49	13	2	15	175			
12TQ035 12TQ040 12TQ045	35 40 45	15	120	0.50	16	2.4	70	150			
MBR1635 MBR1645	35 45	16	125	0.57	—	1.0	40	150		(3B)	
18TQ035 18TQ040 18TQ045	35 40 45	18	149	0.53	24	3.6	25	175			
19TQ015	15	19	80	0.32	6.75	1.5	522	100		(1B)(3A)	
20TQ035 20TQ040 20TQ045	35 40 45	20	116	0.51	27	4	105	150			
1N6391	45	25	115	0.78	40	6	40	175	J9	(1E)(1G)	DO-203AA (DO-4) 
1N6095	30	25	105	0.86	40	6	250	125		(1D)(1H)	
1N6096	40	25	105	0.86	40	6	250	125			
SD41	35	30	96	0.58	—	—	125	150		(1F)	
20FQ035 20FQ040 20FQ045	35 40 45	30	111	0.47	40	6	150	150			
21FQ035 21FQ040 21FQ045	35 40 45	30	107	0.51	40	6	150	150	J10	(1D)(1J)	DO-203AB (DO-5) 
30FQ035 30FQ040 30FQ045	35 40 45	30	144	0.54	40	6	35	175		(1F)	
1N6097	30	50	70	0.86	81	12	250	125			
1N6098	40	50	70	0.86	81	12	250	125		(1E)	
SD51	35	60	90	0.66	—	—	200	150			
1N6392	45	60	115	0.68	101	15	60	175			
50HQ035 50HQ040 50HQ045	35 40 45	60	101	0.53	81	12	200	150			
51HQ035 51HQ040 51HQ045	35 40 45	60	96	0.58	81	12	200	150			
55HQ030	30	60	110	0.41	54	12	280	150			
60HQ080 60HQ100	80 100	60 60	118 118	0.70 0.70	15 15	1 1	20 20	175 175			
75HQ035 75HQ040 75HQ045	35 40 45	75	117	0.63	101	15	45	175			
MBR7535 MBR7545	35 45	75 75	90 90	0.60 0.60	— —	— —	150 150	150 150			
85HQ035 85HQ040 85HQ045	35 40 45	85	112	0.62	114	17	45	175			
95HQ015	15	95	44	0.39	9	2	1000	100			

Notes: See page 40.

Schottky Rectifiers Modules

International
IOR Rectifier


Part Number	VRRM (V)	IF(AV) @ Tc		VFM @ IFM (1) (V)	EAS (2) (mJ)	IAR (3) (A)	IRM @ Rated VRWM (1) (mA)	Max. TJ (°C)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)								
120NQ035	35	120	99	0.52	81	12	400	150	J11		D-67
120NQ040	40										
120NQ045	45										
121NQ035	35	120	133	0.56	81	12	90	175		(1C)	
121NQ040	40										
121NQ045	45										
122NQ030	30	120	110	0.41	54	12	560	150			
123NQ080	80	120	121	0.74	15	1	40	175		(1C)	
123NQ100	100	120	121	0.74	15	1	40	175			
124NQ035	35	120	76	0.52	135	20	1200	125		(1G)	
124NQ040	40										
124NQ045	45										
125NQ015	15	120	71	0.33	9	2	1780	100		(1B)(3A)	
180NQ035	35	180	90	0.56	243	36	600	150			
180NQ040	40										
180NQ045	45										
181NQ035	35	180	125	0.56	243	36	135	175		(1C)	
181NQ040	40										
181NQ045	45										
182NQ030	30	180	107	0.41	162	36	840	150			
183NQ080	80	180	116	0.75	15	1	60	175			
183NQ100	100	180	116	0.75	15	1	60	175			
185NQ015	15	180	66	0.34	9	2	2670	100		(1B)(3A)	
240NQ035	35	240	96	0.55	324	48	800	150			
240NQ040	40										
240NQ045	45										
241NQ035	35	240	130	0.59	324	48	180	175		(1C)	
241NQ040	40										
241NQ045	45										
242NQ030	30	240	111	0.42	216	48	1120	150			
243NQ080	80	240	120	0.72	15	1	80	175		(1C)	
243NQ100	100	240	120	0.72	15	1	80	175			
244NQ035	35	240	75	0.52	270	40	2400	125		(1G)	
244NQ040	40										
244NQ045	45										
245NQ015	15	240	70	0.34	9	2	3560	100			(1B)(3A)



- (1) $T_J = 125^\circ\text{C}$ unless otherwise specified (see Notes column).
 (2) $T_J = 25^\circ\text{C}$, $I_{AS} = I_{AR}$.
 (3) Current decaying linearly to zero in $1 \mu\text{sec}$.
 Frequency limited by T_J max. $V_A = 1.5 \times V_R$ typical unless otherwise specified (see Notes column).
 (4) For case outline drawing see page 160.
 (6) For optional leadforms see pages 167, 168.

- (1B) For V_{FM} : $T_J = 75^\circ\text{C}$; for I_{RM} : $T_J = 100^\circ\text{C}$, $V_{RWM} = 12\text{V}$.
 (1C) For V_{FM} : $T_J = 175^\circ\text{C}$; for I_{RM} : $T_J = 125^\circ\text{C}$.
 (1G) For V_{FM} : $T_J = 100^\circ\text{C}$; for I_{RM} : $T_J = 125^\circ\text{C}$.
 (3A) Current decaying linearly to zero in $1 \mu\text{sec}$.
 Frequency limited by T_J max. $V_A = 3 \times V_R$ typical.
 (3B) Current decaying linearly to zero in $2 \mu\text{sec}$.
 Frequency limited by T_J max. $V_A = 1.5 \times V_R$ typical.



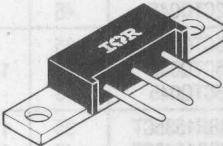
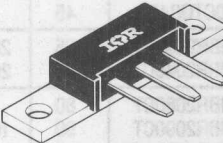
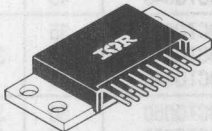

Part Number	VRRM (V)	IF(AV) @ Tc		VFM @ IFM (1) (V)	EAS (2) (mJ)	IAR (3) (A)	IRM @ Rated VRWM (1) (mA)	Max. TJ (°C)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)								
10CTQ150	150	10	145	0.86	6.75	0.30	7	175	K2	(3B)	TO-220AB (6) 
12CTQ035	35	12	157	0.63	8	1.2	7	175			
12CTQ040	40										
12CTQ045	45										
15CTQ035	35	15	123	0.65	10	1.5	32	150			
15CTQ040	40										
15CTQ045	45										
MBR1535CT	35	15	105	0.72	—	1.0	15	150			
MBR1545CT	45	15	105	0.72	—	1.0	15	150			
16CTQ080	80	16	145	0.69	7.5	0.5	7	175			
16CTQ100	100	16	145	0.69	7.5	0.5	7	175			
20CTQ035	35	20	145	0.68	13	2	15	175			
20CTQ040	40										
20CTQ045	45										
MBR2035CT	35	20	135	0.72	—	1.0	15	150			
MBR2045CT	45	20	135	0.72	—	1.0	15	150			
MBR2080CT	80	10	133	0.70	—	0.5	150	150			
MBR2090CT	90					0.5					
MBR20100CT	100					0.5					
MBR2535CT	35	30	130	0.73	—	1.0	40	150			
MBR2545CT	45	30	130	0.73	—	1.0	40	150			
25CTQ035	35	30	102	0.64	20	3	70	150			
25CTQ040	40										
25CTQ045	45										
30CTQ035	35	30	127	0.70	20	3	15	175			
30CTQ040	40										
30CTQ045	45										
30CTQ050	50	30	97	0.71	13	1.5	45	150			
30CTQ060	60	30	97	0.71	13	1.5	45	150			
32CTQ030	30	30	109	0.53	13	3	97	150			
30CPQ035	35	30	124	0.64	20	3	70	150			
30CPQ040	40										
30CPQ045	45										
30CPQ050	50	30	112	0.70	13	1.5	45	150			
30CPQ060	60	30	112	0.70	13	1.5	45	150			
30CPQ080	80	30	140	0.81	7.5	0.5	7	175			
30CPQ100	100	30	140	0.81	7.5	0.5	7	175			
30CPQ150	150	30	131	0.93	11.25	0.5	15	175			
MBR3035PT	35	30	105	0.72	—	2.0	100	150			
MBR3045PT	45	30	105	0.72	—	2.0	100	150			
40CPQ035	35	40	120	0.56	27	4	150	150			
40CPQ040	40										
40CPQ045	45										
40CPQ050	50	40	120	0.64	18	2	96	150			
40CPQ060	60	40	120	0.64	18	2	96	150			
40CPQ080	80	40	145	0.75	11.25	0.75	15	175			
40CPQ100	100	40	145	0.75	11.25	0.75	15	175			
MBR3035CT	35	30	105	0.72	—	2.0	60	150			
MBR3045CT	45	30	105	0.72	—	—	60	150			
40CDQ035	35	40	135	0.71	27	4	25	175			
40CDQ040	40										
40CDQ045	45										
SD241	35	60	120	0.92	—	—	20	175			
60CDQ035	35	60	112	0.80	40	6	25	175			
60CDQ040	40										
60CDQ045	45										

Notes: See page 42.

Schottky Rectifiers

Modules — Center Tap

International
IOR Rectifier

Part Number	VRRM (V)	I _F (AV) @ T _C		V _{FM} @ I _{FM} (1) (1B) (V)	E _{AS} (2) (mJ)	I _{AR} (3) (A)	I _{RM} @ Rated V _{RWM} (1) (mA)	Max. T _J (°C)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)								
60CNQ035 60CNQ040 60CNQ045	35 40 45	60	116	0.44	40	6	200	150	K4		D-61-6 
61CNQ035 61CNQ040 61CNQ045	35 40 45	60	149	0.49	40	6	45	175			
62CNQ030	30	60	135	0.35	27	6	280	150			
63CNQ080 63CNQ100	80 100	60 60	155 155	0.64 0.64	15 15	1 1	20 20	175 175			
80CNQ035 80CNQ040 80CNQ045	35 40 45	80	109	0.47	54	8	200	150			
81CNQ035 81CNQ040 81CNQ045	35 40 45	80	141	0.54	54	8	45	175			
82CNQ030	30	80	119	0.35	36	8	280	150	K5	(1C)	D-61-8 
83CNQ080 83CNQ100	80 100	80 80	132 132	0.67 0.67	15 15	1 1	20 20	175 175			
84CNQ035 84CNQ040 84CNQ045	35 40 45	80	91	0.44	54	8	600	125			
85CNQ015	15	80	78	0.32	9	2	890	100			
150CMQ035 150CMQ040 150CMQ045	35 40 45	150	71	0.60	101	15	200	150			
151CMQ035 151CMQ040 151CMQ045	35 40 45	150	104	0.65	101	15	45	175			
152CMQ030	30	150	85	0.47	68	15	280	150	K6		D-60 
153CMQ080 153CMQ100	80 100	150 150	90 90	0.80 0.80	15 15	1 1	20 20	175 175			
160CMQ035 160CMQ040 160CMQ045	35 40 45	160	69	0.60	108	16	200	150			
161CMQ035 161CMQ040 161CMQ045	35 40 45	160	101	0.63	108	16	45	175	K7		TO-249AA 
162CMQ030	30	160	83	0.46	72	16	280	150			
163CMQ080 163CMQ100	80 100	160 160	87 87	0.80 0.80	15 15	1 1	20 20	175 175			

(1) T_J = 125°C unless otherwise specified (see Notes column).

(2) T_J = 25°C, I_{AS} = I_{AR}.

(3) Current decaying linearly to zero in 1 μsec.

Frequency limited by T_J max. V_A = 1.5 x V_R typical unless otherwise specified (see Notes column).

(4) For case outline drawing see page 160.

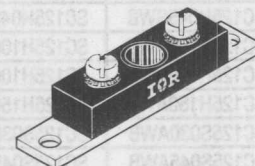
(1B) For V_{FM}: T_J = 75°C; for I_{RM}: T_J = 100°C, V_{RWM} = 12V, I_F = I_{FM}/2 per leg.

(3A) Current decaying linearly to zero in 1 μsec.

Frequency limited by T_J max. V_A = 3 x V_R typical.

(1G) For V_{FM}: T_J = 100°C; for I_{RM}: T_J = 125°C.

Part Number	VRRM (V)	IF(AV) @ Tc		VFM @ IFM (1) (V)	EAS (2) (mJ)	IAR (3) (A)	IRM @ Rated VRWM (1) (mA)	Max. TJ (°C)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)								
200CNQ035 200CNQ040 200CNQ045	35 40 45	200	108	0.49	135	20	400	150	K8		TO-244AB
201CNQ035 201CNQ040 201CNQ045	35 40 45	200	138	0.58	135	20	90	175		(1C)	
203CNQ080 203CNQ100	80 100	200	130	0.70 0.70	15 15	1 1	40 40	175 175			
220CNQ030	30	220	114	0.40	99	22	560	150			
224CNQ035 224CNQ040 224CNQ045	35 40 45	220	81	0.50	135	20	1200	125		(1G)	
225CNQ015	15	220	74	0.32	9	2	1780	100		(1B)(3A)	
301CNQ035 301CNQ040 301CNQ045	35 40 45	300	120	0.59	202	30	90	175		(1C)	
303CNQ080 303CNQ100	80 100	300	126	0.72 0.72	15 15	1 1	60 60	175 175			
400CNQ035 400CNQ040 400CNQ045	35 40 45	400	105	0.52	180	40	800	150			
401CNQ035 401CNQ040 401CNQ045	35 40 45	400	138	0.56	270	40	180	175		(1C)	
403CNQ080 403CNQ100	80 100	400	105	0.69 0.69	15 15	1 1	80 80	175 175			
440CNQ030	30	440	115	0.41	198	44	1120	150			
444CNQ035 444CNQ040 444CNQ045	35 40 45	440	81	0.51	270	40	2400	125		(1G)	



- (1) $T_J = 125^\circ\text{C}$ unless otherwise specified (see Notes column).
 (2) $T_J = 25^\circ\text{C}$, $I_{AS} = I_{AR}$.
 (3) Current decaying linearly to zero in $1\ \mu\text{sec}$.
 Frequency limited by T_J max. $V_A = 1.5 \times V_R$ typical unless otherwise specified (see Notes column).
 (4) For case outline drawing see page 160.

- (1B) For V_{FM} : $T_J = 75^\circ\text{C}$; for I_{RM} : $T_J = 100^\circ\text{C}$, $V_{RWM} = 12\text{V}$.
 (1C) For V_{FM} : $T_J = 175^\circ\text{C}$; for I_{RM} : $T_J = 125^\circ\text{C}$.
 (3A) Current decaying linearly to zero in $1\ \mu\text{sec}$.
 Frequency limited by T_J max. $V_A = 3 \times V_R$ typical.

Schottky Rectifiers

Schottky Die

Wafer(1) Part Number	Die(2) Part Number	Die "A" Length/Side (in.) mm	Bond Pad "B" Length/Side (in.) mm	Anode Metallization (Topside)	Process	Tray Quantity	Equivalent Finished Product
SC043H100SWB	N/A	(0.0433) 1.10	(0.0362) 0.92	Silver	830	N/A	10MQ, 11DQ
SC043S040SWB	N/A	(0.0433) 1.10	(0.0362) 0.92	Silver	Standard	N/A	10MQ, 11DQ
SC043S060SWB	N/A	(0.0433) 1.10	(0.0362) 0.92	Silver	Standard	N/A	10MQ, 11DQ
SC066H100AWB	N/A	(0.0661) 1.68	(0.0591) 1.50	Aluminum	830	N/A	6CWQ, 30WQ, 50WQ
SC066H100SWB	N/A	(0.0661) 1.68	(0.0591) 1.50	Silver	830	N/A	31DQ
SC066S040AWB	N/A	(0.0661) 1.68	(0.0591) 1.50	Aluminum	Standard	N/A	6CWQ, 30WQ, 50WQ
SC066S040SWB	N/A	(0.0661) 1.68	(0.0591) 1.50	Silver	Standard	N/A	31DQ
SC066S060AWB	N/A	(0.0661) 1.68	(0.0591) 1.50	Aluminum	Standard	N/A	6CWQ, 30WQ, 50WQ
SC066S060SWB	N/A	(0.0661) 1.68	(0.0591) 1.50	Silver	Standard	N/A	31DQ
SC090H045AWB	SC090H045A	0.0900 (2.29)	0.0700 (1.78)	Aluminum	830	196	12CTQ
SC090H150AWB	SC090H150A	0.0900 (2.29)	0.0700 (1.78)	Aluminum	830	196	10CTQ
SC090S045AWB	SC090S045A	0.0900 (2.29)	0.0700 (1.78)	Aluminum	Standard	196	15CTQ
SC125H045AWB	SC125H045A	0.125 (3.18)	0.105 (2.67)	Aluminum	830	100	10TQ, 20CTQ, 30CTQ
SC125H045SWB	SC125H045S	0.125 (3.18)	0.105 (2.67)	Silver	830	100	80SQ
SC125H100AWB	SC125H100A	0.125 (3.18)	0.105 (2.67)	Aluminum	830	100	8TQ, 16CTQ, 30CPQ
SC125H100SWB	SC125H100S	0.125 (3.18)	0.105 (2.67)	Silver	830	100	50SQ
SC125H150AWB	SC125H150A	0.125 (3.18)	0.105 (2.67)	Aluminum	830	100	30CPQ
SC125S030AWB	SC125S030A	0.125 (3.18)	0.105 (2.67)	Aluminum	Standard	100	32CTQ
SC125S045AWB	SC125S045A	0.125 (3.18)	0.105 (2.67)	Aluminum	Standard	100	25CTQ, 30CPQ
SC125S045SWB	SC125S045S	0.125 (3.18)	0.105 (2.67)	Silver	Standard	100	90SQ
SC125S060AWB	SC125S060A	0.125 (3.18)	0.105 (2.67)	Aluminum	Standard	100	30CPQ
SC150H045AWB	SC150H045A	0.150 (3.81)	0.130 (3.30)	Aluminum	830	49	18TQ, 40CDQ, 60CDQ, SD241
SC150R015AWB	SC150R015A	0.150 (3.81)	0.130 (3.30)	Aluminum	OR'ing	49	19TQ
SC150S045AWB	SC150S045A	0.150 (3.81)	0.130 (3.30)	Aluminum	Standard	49	20TQ
SC175H045SWB	SC175H045S	0.175 (4.45)	0.155 (3.94)	Silver	830	49	30FQ, 1N6391
SC175H100AWB	SC175H100A	0.175 (4.45)	0.155 (3.94)	Aluminum	830	49	40CPQ
SC175H100SWB	SC175H100S	0.175 (4.45)	0.155 (3.94)	Silver	830	49	30FQ
SC175S045AWB	SC175S045A	0.175 (4.45)	0.155 (3.94)	Aluminum	Standard	49	40CPQ
SC175S045SWB	SC175S045S	0.175 (4.45)	0.155 (3.94)	Silver	Standard	49	20FQ, 21FQ, 1N6096, SD41
SC175S060AWB	SC175S060A	0.175 (4.45)	0.155 (3.94)	Aluminum	Standard	49	40CPQ
SC200E045SWB	SC200E045S	0.200 (5.08)	0.180 (4.57)	Silver	Efficient	36	84CNQ, 224CNQ, 444CNQ
SC200H045SWB	SC200H045S	0.200 (5.08)	0.180 (4.57)	Silver	830	36	75HQ, 85HQ, 61CNQ, 81CNQ 61CMQ, 161CMQ, 121CNQ, 201CNQ, 301CNQ, 401CNQ
SC200H100SWB	SC200H100S	0.200 (5.08)	0.180 (4.57)	Silver	830	36	60HQ, 63CNQ, 83CNQ 63CMQ, 163CMQ, 203CNQ, 303CNQ, 403CNQ
SC200R015SWB	SC200R015S	0.200 (5.08)	0.180 (4.57)	Silver	OR'ing	36	85CNQ
SC200S030SWB	SC200S030S	0.200 (5.08)	0.180 (4.57)	Silver	Standard	36	55HQ, 62CNQ, 82CNQ 62CMQ, 162CMQ 132CNQ, 220CNQ, 440CNQ
SC200S045SWB	SC200S045S	0.200 (5.08)	0.180 (4.57)	Silver	Standard	36	50HQ, 51HQ, SD51 60CNQ, 80CNQ, 60CMQ, 160CMQ 120CNQ, 200CNQ, 400CNQ
SC275H045SWB	SC275H045S	0.275 (6.99)	0.255 (6.48)	Silver	830	25	N/A
SC275H100SWB	SC275H100S	0.275 (6.99)	0.255 (6.48)	Silver	830	25	N/A
SC275S030SWB	SC275S030S	0.275 (6.99)	0.255 (6.48)	Silver	Standard	25	N/A
SC275S045SWB	SC275S045S	0.275 (6.99)	0.255 (6.48)	Silver	Standard	25	N/A

(1) Die in probed un-cut, wafer form.

(2) Die in probed waffle pack form. For die outline drawing see page 190.

(3) All die and bond pads are square.

CODING

SC 125 H 045 A

SC - Schottky Chip

125 - Die Size in inches x 1000; e.g. 125 = 0.125"

H = Process; e.g. E = Efficient Low VF; H = '830' High Temperature; R = 'OR'ing' Lowest VF; S = Standard

045 = Voltage Rating; e.g. 015 = 15V; 030 = 30V; 045 = 45V; 060 = 60V; 100 = 100V; 150 = 150V

A = Anode Final Metallization; e.g. A = Aluminum; S = Silver

Rectifiers

Ultra-Fast & Fast Recovery



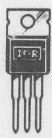
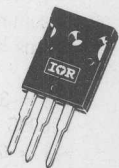


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Rectifiers


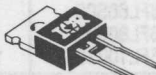


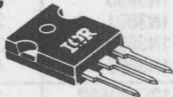
Ultra-Fast Recovery

1 to 25 Amps

International
IOR Rectifier


Part Number	V _{RWM} (V)	I _{F(AV)} @ T _C		V _{FM} @ I _{F(AV)} (V)	I _{FSM} ⁽¹⁾ @ 60 Hz (A)	R _{thJC} DC (°C/W)	Max. t _{rr} (ns)	Case Outline Number	Notes	Case Style					
		(A)	(°C)												
10DF1 10DF2 10DF4 10DF6 10DF8	100 200 400 600 800	1 1 1 1 1	25 25 25 25 25	1.05 1.05 1.20 1.20 1.20	34 34 34 34 34	115 115 115 115 115	100 100 100 100 100	J2	(2)	DO-204AL DO-41					
11DF1 11DF2 11DF3 11DF4	100 200 300 400	1 1 1 1	63 63 63 63	0.98 0.98 1.25 1.25	31.4 31.4 31.4 31.4	115 115 115 115	35 35 30 30			C-16					
30DF1 30DF2 30DF4 30DF6	100 200 400 600	3 3 3 3	40 40 40 40	1.05 1.05 1.25 1.25	90 90 90 90	80 80 80 80	200 200 200 200	J3							
31DF1 31DF2 31DF3 31DF4	100 200 300 400	3 3 3 3	57 57 57 57	0.98 0.98 1.25 1.25	62.8 62.8 62.8 62.8	80 80 80 80	35 35 30 30								
10MF2	200	1	122	0.98	28	160	50	J1	(3)	D-64					
30WF10F 30WF20F 30WF30F 30WF40F	100 200 300 400	3.3 3.3 3.3 3.3	104 104 104 104	1.35 1.35 1.35 1.35	31.4 31.4 31.4 31.4	8 8 8 8	30 30 30 30	J5	(3)	TO-252 D-PAK					
50WF10F 50WF20F 50WF30F 50WF40F	100 200 300 400	5.5 5.5 5.5 5.5	104 104 104 104	1.1 1.1 1.1 1.1	47 47 47 47	6 6 6 6	40 40 40 40								
6CWF10F 6CWF20F	100 200	6.6 6.6	117 117	0.98 0.98	47 47	80 80	30 30								
10CTF10 10CTF20 10CTF30 10CTF40	100 200 300 400	10 10 10 10	117 117 112 112	0.98 0.98 1.25 1.25	84 84 84 84	3 3 3 3	35 35 45 45	J7	(5)	TO-220AB					
10JTF10 10JTF20 10JTF30 10JTF40	100 200 300 400	10 10 10 10	117 117 112 112	0.98 0.98 1.25 1.25	84 84 84 84	3 3 3 3	35 35 45 45		(5)						
16CPF10 16CPF20 16CPF30 16CPF40	100 200 300 400	16 16 16 16	113 113 109 109	0.98 0.98 1.25 1.25	126 126 126 126	2 2 2 2	35 35 45 45	J8		TO-247AA					
16JPF10 16JPF20 16JPF30 16JPF40	100 200 300 400	16 16 16 16	113 113 109 109	0.98 0.98 1.25 1.25	126 126 126 126	2 2 2 2	35 35 45 45		(4)						
25CPF10 25CPF20 25CPF30 25CPF40	100 200 300 400	25 25 25 25	93 93 85 85	0.98 0.98 1.25 1.25	157 157 183 183	2 2 2 2	50 50 60 60								
25JPF10 25JPF20 25JPF30 25JPF40	100 200 300 400	25 25 25 25	93 93 85 85	0.98 0.98 1.25 1.25	157 157 183 183	2 2 2 2	50 50 60 60	(4)							

Notes: See page 49.

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		V _{FM} @ I _{F(AV)} (V)	I _R @ V _{RRM} (μA)	R _{thJC} Deg C/W	(14) Typ I _{RRM} (A)	(15) Typ t _{rr} (ns)	(12) Case Outline Number	Notes	Case Style
		(A)	(°C)								
HFA06SD60	600	6	100	—	—	—	—	—	J5		T0252AA D-Pak 
HFA08TB60	600	8	90	—	—	—	—	—	J6		T0220AC 
HFA15TB60	600	15	100	1.7	10	1.7	4	19			
HFA25TB60	600	25	100	—	—	—	—	—			
HFA20TB120	1200	20	100	—	—	—	—	—			
HFA16TA60C	600	16	100	—	—	—	—	—	K2	(5) (16)	T0220AB 
HFA30TA60C	600	30	100	1.7	10	0.85	4	19			
HFA08PB60	600	8	100	—	—	—	—	—	J12		T0247AC MOD 
HFA15PB60	600	15	100	1.7	10	1.7	4	19			
HFA25PB60	600	25	100	—	—	—	—	—			
HFA20PB120	1200	20	100	—	—	—	—	—			
HFA16PA60C	600	16	100	—	—	—	—	—	K3	(16)	T0247AC 
HFA30PA60C	600	30	100	1.7	10	0.83	4	19			
HFA50PA60C	600	50	100	—	—	—	—	—			

Super-Fast Recovery

30 to 60 Amps

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (6)		V _{FM} (V)	R _{thJC} DC (°C/W)	t _{rr} (10) (nS)	Case Outline Number (12)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
30HFU-100	100	30	91	400	420	1.45	0.60	60	R7A	(7) (8) (11) (13)	DO-203AB (DO-5) 
30HFU-200	200	30	91	400	420	1.45	0.60	60			
30HFU-400	400	30	91	400	420	1.45	0.60	60			
30HFU-600	600	30	91	400	420	1.45	0.60	60			
60HFU-100	100	60	82	700	730	1.50	0.36	60		(8) (9) (11) (13)	
60HFU-200	200	60	82	700	730	1.50	0.36	60			
60HFU-400	400	60	82	700	730	1.50	0.36	60			
60HFU-600	600	60	82	700	730	1.50	0.36	60			

- Following any rated load condition and with rated V_{RRM} reapplied.
- Available on tape and reel. See pages 164-166.
- For ordering information on tape and reel see pages 164-166.
- Reverse polarity — common anode devices.
- For lead formed options see pages 167, 168.
- 100% V_{RRM} reapplied.
- V_{FM} conditions: I_{FM} = 30 Apk, T_J = 25°C.
- I_{F(AV)} conditions: 180°C conduction, half sine.
- V_{FM} conditions: I_{FM} = 60 Apk, T_J = 25°C.
- T_J = 25°C, I_F = 1A, -di/dt = 100 A/μs, V_R = 30V.
- Available with metric stud on request, to specify add "M" to end of part number (e.g., 60HFU-200M).
- For case outline drawing see page 160 and/or 169.
- Cathode-to-stud. For anode-to-stud, add "R" to basic part number (e.g., 60HFUR-400).
- I_{RRM} @ I_F = I_{F(AV)}, diF/dt = 200A/μs.
- t_{rr} @ I_F = 1A, diF/dt = 200A/μs.
- Specifications are given per leg.

Rectifiers

Fast Recovery

6-16 Amps

International
IOR Rectifier

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times IF(AV)$ (V)	RthJC DC (°C/W)	trr (2) (ns)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
6FL10S02 6FL20S02 6FL40S02 6FL60S02	100 200 400 600	6	100	110	115	1.40	2.50	200	R6	(3) (5)	DO-203AA (DO-4)
6FL10S05 6FL20S05 6FL40S05 6FL60S05 6FL80S05 6FL100S05	100 200 400 600 800 1000	6	100	110	115	1.40	2.50	500			
6FL10S10 6FL20S10 6FL40S10 6FL60S10 6FL80S10 6FL100S10	100 200 400 600 800 1000	6	100	110	115	1.40	2.50	1000			
1N3879 1N3880 1N3881 1N3882 1N3883	50 100 200 300 400	6	100	72	75	1.40	2.50	300			
1N3889 1N3890 1N3891 1N3892 1N3893	50 100 200 300 400	12	100	145	150	1.40	2.00	300			
12FL10S02 12FL20S02 12FL40S02 12FL60S02	100 200 400 600	12	100	145	150	1.40	2.00	200			
12FL10S05 12FL20S05 12FL40S05 12FL60S05 12FL80S05 12FL100S05	100 200 400 600 800 1000	12	100	145	150	1.40	2.00	500			
12FL10S10 12FL20S10 12FL40S10 12FL60S10 12FL80S10 12FL100S10	100 200 400 600 800 1000	12	100	145	150	1.40	2.00	1000			
16FL10S02 16FL20S02 16FL40S02 16FL60S02	100 200 400 600	16	100	180	190	1.40	1.60	200			
16FL10S05 16FL20S05 16FL40S05 16FL60S05 16FL80S05 16FL100S05	100 200 400 600 800 1000	16	100	180	190	1.40	1.60	500			
16FL10S10 16FL20S10 16FL40S10 16FL60S10 16FL80S10 16FL100S10	100 200 400 600 800 1000	16	100	180	190	1.40	1.60	1000			



(1) 100% VRRM reapplied @ $T_j = T_{j \text{ max}} = 150^\circ\text{C}$.

(2) trr conditions: $IFM = \pi \cdot IF$ and $dIF/dt = 25 \text{ A}/\mu\text{s}$.

(3) Cathode-to-stud. For anode-to-stud, add "R" to basic Part number (e.g., 12FLR10S02, 1N3879R).

(5) Available with metric stud on request; to specify add "M" to the end of part number (e.g., 6FL100S10M).

(6) For case outline drawing see page 169.

Part Number	VRRM (V)	IF(AV) @ TC		IFSM (1)		VFM @ $\pi \times IF(AV)$ (V)	RthJC DC (°C/W)	trr (2) (ns)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
IRD3899 IRD3900 IRD3901 IRD3902 IRD3903	50 100 200 300 400	20	100	240	250	1.65	0.60	350	R7 A	(3) (5)	DO-203AB (DO-5)
IRD3909 IRD3910 IRD3911 IRD3912 IRD3913	50 100 200 300 400	30	100	285	300	1.80	0.46	350			
40HFL10S02 40HFL20S02 40HFL40S02 40HFL60S02	100 200 400 600	40	75	400	420	1.95	0.60	200			
40HFL10S05 40HFL20S05 40HFL40S05 40HFL60S05 40HFL80S05 40HFL100S05	100 200 400 600 800 1000	40	75	400	420	1.95	0.60	500			
40HFL10S10 40HFL20S10 40HFL40S10 40HFL60S10 40HFL80S10 40HFL100S10	100 200 400 600 800 1000	40	75	400	420	1.95	0.60	1000			
70HFL10S02 70HFL20S02 70HFL40S02 70HFL60S02	100 200 400 600	70	75	700	730	1.85	0.36	200			
70HFL10S05 70HFL20S05 70HFL40S05 70HFL60S05 70HFL80S05 70HFL100S05	100 200 400 600 800 1000	70	75	700	730	1.85	0.36	500			
70HFL10S10 70HFL20S10 70HFL40S10 70HFL60S10 70HFL80S10 70HFL100S10	100 200 400 600 800 1000	70	75	700	730	1.85	0.36	1000			
85HFL10S02 85HFL20S02 85HFL40S02 85HFL60S02	100 200 400 600	85	75	1100	1150	1.75	0.30	200			
85HFL10S05 85HFL20S05 85HFL40S05 85HFL60S05 85HFL80S05 85HFL100S05	100 200 400 600 800 1000	85	75	1100	1150	1.75	0.30	500			
85HFL10S10 85HFL20S10 85HFL40S10 85HFL60S10 85HFL80S10 85HFL100S10	100 200 400 600 800 1000	85	75	1100	1150	1.75	0.30	1000			





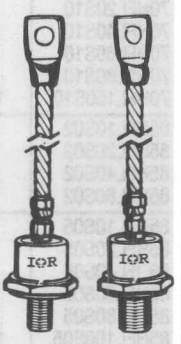
- (1) 100% VRRM reapplied @ $T_j = T_j \text{ max} = 125^\circ\text{C}$.
(2) trr conditions: IFM = $\pi \cdot IF$ and $dIF/dt = 25 \text{ A}/\mu\text{s}$.
(3) Cathode-to-stud. For anode-to-stud, add "R" to basic Part number (e.g., 40HFLR10S02, IRD3909R).
(5) Available with metric stud on request; to specify add "M" to the end of number (e.g., 40HFL100S10M).
(6) For case outline drawing see page 169.

Rectifiers

Fast Recovery

90-110 Amps

International
IOR Rectifier

Part Number	V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_F$ (AV) (V)	R _{thJC} DC (°C/W)	t _{rr} (2) (ns)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
R18SGF6A	600	110	85	3250	3400	1.49	0.250	900	R8 A	(5)	DO-205AA (DO-8) 
R18SGF6B	600	110	85	3250	3400	1.49	0.250	1100			
R18SGF8A	800	110	85	3250	3400	1.49	0.250	900			
R18SGF8B	800	110	85	3250	3400	1.49	0.250	1100			
R18SGF10A	1000	105	85	3050	3200	1.54	0.250	1000			
R18SGF10B	1000	105	85	3050	3200	1.54	0.250	1200			
R18SGF12A	1200	105	85	3050	3200	1.54	0.250	1000			
R18SGF12B	1200	105	85	3050	3200	1.54	0.250	1200			
R18SF14A	1400	100	85	2770	2900	1.67	0.250	1250			
R18SF14B	1400	100	85	2770	2900	1.67	0.250	1500			
R18SF16A	1600	100	85	2770	2900	1.67	0.250	1250	R9 A		
R18SF16B	1600	100	85	2770	2900	1.67	0.250	1500			
R18SF18A	1800	90	85	2390	2500	1.82	0.250	2000			
R18SF18B	1800	90	85	2390	2500	1.82	0.250	2400			
R18SF20A	2000	90	85	2390	2500	1.82	0.250	2000			
R18SF20B	2000	90	85	2390	2500	1.82	0.250	2400			
R18CGF6A	600	110	85	3250	3400	1.49	0.250	900	R10 A	(5)	DO-205AC (DO-30) 
R18CGF6B	600	110	85	3250	3400	1.49	0.250	1100			
R18CGF8A	800	110	85	3250	3400	1.49	0.250	900			
R18CGF8B	800	110	85	3250	3400	1.49	0.250	1100			
R18CGF10A	1000	105	85	3050	3200	1.54	0.250	1000			
R18CGF10B	1000	105	85	3050	3200	1.54	0.250	1200			
R18CGF12A	1200	105	85	3050	3200	1.54	0.250	1000			
R18CGF12B	1200	105	85	3050	3200	1.54	0.250	1200			
R18CF14A	1400	100	85	2770	2900	1.67	0.250	1250			
R18CF14B	1400	100	85	2770	2900	1.67	0.250	1500			
R18CF16A	1600	100	85	2770	2900	1.67	0.250	1250	R11 A		
R18CF16B	1600	100	85	2770	2900	1.67	0.250	1500			
R18CF18A	1800	90	85	2390	2500	1.82	0.250	2000			
R18CF18B	1800	90	85	2390	2500	1.82	0.250	2400			
R18CF20A	2000	90	85	2390	2500	1.82	0.250	2000			
R18CF20B	2000	90	85	2390	2500	1.82	0.250	2400			
SD103N02S05P	200	110	85	3000	3141	2.23	0.160	500	(4)	(3)	DO-205AA (DO-8) DO-205AC (DO-30) 
SD103N04S05P	400							500			
SD103N06S05P	600							500			
SD103N08S05P	800							500			
SD103N10S05P	1000							500			
SD103N02S10P	200							1000			
SD103N04S10P	400							1000			
SD103N06S10P	600							1000			
SD103N08S10P	800							1000			
SD103N10S10P	1000							1000			
SD103N12S10P	1200							1000			
SD103N14S10P	1400							1000			
SD103N02S15P	200							1500			
SD103N04S15P	400							1500			
SD103N06S15P	600							1500			
SD103N08S15P	800							1500			
SD103N10S15P	1000							1500			
SD103N12S15P	1200							1500			
SD103N14S15P	1400							1500			
SD103N02S20P	200							2000			
SD103N04S20P	400							2000			
SD103N06S20P	600							2000			
SD103N08S20P	800							2000			
SD103N10S20P	1000							2000			
SD103N12S20P	1200							2000			
SD103N14S20P	1400							2000			
SD103N16S20P	1600							2000			
SD103N18S20P	1800							2000			
SD103N20S20P	2000							2000			
SD103N22S20P	2200							2000			

(1) 100% V_{RRM} reapplied @ T_j = T_j max = 125°C.

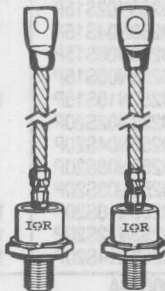
(2) T_j = 25°C.

(3) Cathode-to-stud. For anode-to-stud change "N" to "R" (eg. SD103R02S20P).

(4) For devices up to 1200 V, outline number is R8B/R10B; for devices with V_{RRM} ≥ 1400 V, outline number is R9B/R11B.

(5) For reverse polarity, anode to stud, insert "R" before digit designating voltage code (R18CFR20B).

(6) For case outline drawing see page 169.

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ π x I _{F(AV)} (V)	R _{thJC} DC (°C/W)	t _{rr} (2) (ns)	Case Outline Number (7)	Notes	Case Style							
		(A)	(°C)	50 Hz (A)	60 Hz (A)													
SD153N02S10P SD153N04S10P SD153N06S10P SD153N08S10P SD153N10S10P SD153N02S15P SD153N04S15P SD153N06S15P SD153N08S15P SD153N10S15P SD153N12S15P SD153N14S15P SD153N02S20P SD153N04S20P SD153N06S20P SD153N08S20P SD153N10S20P SD153N12S20P SD153N14S20P	200 400 600 800 1000 200 400 600 800 1000 1200 1400 200 400 600 800 1000 1200 1400	150	85	3600	3770	1.55	0.160	1000 1000 1000 1000 1000 1500 1500 1500 1500 1500 1500 1500 2000 2000 2000 2000 2000 2000 2000	(4)	(3)	DO-205AC (DO-30) DO-205AA (DO-8) 							
R23DGF6A R23DGF6B R23DGF8A R23DGF8B R23DGF10A R23DGF10B R23DGF12A R23DGF12B R23DF14A R23DF14B R23DF16A R23DF16B R23DF18A R23DF18B R23DF20A R23DF20B R23DF22A R23DF22B R23DF24A R23DF24B	600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600 1800 1800 2000 2000 2200 2200 2400 2400							190 190 190 190 180 180 180 180 170 170 170 170 150 150 150 150 135 135 135 135				85 85 85 85 85 85 85 85 85 85 85 85 85 85 85 85 85 85 85	4960 4960 4960 4960 4775 4775 4775 4775 4530 4530 4530 4530 4400 4400 4400 4400 4000 4000 4000 4000	5200 5200 5200 5200 5000 5000 5000 5000 4750 4750 4750 4750 4600 4600 4600 4600 4200 4200 4200 4200	1.49 1.49 1.49 1.49 1.53 1.53 1.53 1.53 1.65 1.65 1.65 1.65 1.80 1.80 1.80 1.80 1.92 1.92 1.92 1.92	0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150 0.150	900 1100 900 1100 1000 1200 1000 1200 1250 1500 1250 1500 2000 2400 2000 2400 2750 3300 2750 3300	R13 A <

 (1) 100% V_{RRM} reapplied @ T_j = T_j max = 125°C.

 (2) T_j = 25°C.

(3) Cathode-to-stud. For anode-to-stud change "N" to "R" (eg. SD203N02S10P).

 (4) For devices up to 1200 V, outline number is R8B/R10B; for devices with V_{RRM} ≥ 1400 V, outline number is R9B/R11B.

 (5) For devices up to 1200 V, outline number is R13B; for devices with V_{RRM} ≥ 1400 V, outline number is R14B.

(6) For reverse polarity, anode to stud, insert "R" before digit designating voltage code (R23DGF6A).




(7) For case outline drawing see page 169.

Rectifiers

Fast Recovery

185-300 Amps

International
IOR Rectifier

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times IF(AV)$ (V)	RthJC DC (°C/W)	t _{rr} (3) (ns)	Case Outline Number (7)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
SD253N02S10P	200							1000	(5)	(4)	DO-205AB (DO-9) 
SD253N04S10P	400							1000			
SD253N06S10P	600							1000			
SD253N08S10P	800							1000			
SD253N10S10P	1000							1000			
SD253N02S15P	200							1500			
SD253N04S15P	400							1500			
SD253N06S15P	600							1500			
SD253N08S15P	800							1500			
SD253N10S15P	1000	250	85	4500	4710	1.38	0.115	1500			
SD253N02S20P	200							2000			
SD253N04S20P	400							2000			
SD253N06S20P	600							2000			
SD253N08S20P	800							2000			
SD253N10S20P	1000							2000			
SD253N12S20P	1200							2000			
SD253N14S20P	1400							2000			
R30DF6A	600	255	85	9550	10000	1.40	0.120	900	R17 B	(6)	B-8 
R30DF6B	600	255	85	9550	10000	1.40	0.120	1100			
R30DF8A	800	255	85	9550	10000	1.40	0.120	900			
R30DF8B	800	255	85	9550	10000	1.40	0.120	1100			
R30DF10A	1000	245	85	9070	9500	1.46	0.120	1000			
R30DF10B	1000	245	85	9070	9500	1.46	0.120	1200			
R30DF12A	1200	245	85	9070	9500	1.46	0.120	1000			
R30DF12B	1200	245	85	9070	9500	1.46	0.120	1200			
R30DF14A	1400	230	85	8600	9000	1.54	0.120	1250			
R30DF14B	1400	230	85	8600	9000	1.54	0.120	1500			
R30DF16A	1600	230	85	8600	9000	1.54	0.120	1250			
R30DF16B	1600	230	85	8600	9000	1.54	0.120	1500			
R30DF18A	1800	210	85	8300	8700	1.69	0.120	2000			
R30DF18B	1800	210	85	8300	8700	1.69	0.120	2400			
R30DF20A	2000	210	85	8300	8700	1.69	0.120	2000			
R30DF20B	2000	210	85	8300	8700	1.69	0.120	2400			
R30DF22A	2200	185	85	7800	8200	1.83	0.120	2750			DO-200AA 
R30DF22B	2200	185	85	7800	8200	1.83	0.120	3300			
R30DF24A	2400	185	85	7800	8200	1.83	0.120	2750			
R30DF24B	2400	185	85	7800	8200	1.83	0.120	3300			
R23AF6A	600	300	85	4960	5200	1.63	0.080	900	R18 A	(2)	
R23AF6B	600	300	85	4960	5200	1.63	0.080	1100			
R23AF8A	800	300	85	4960	5200	1.63	0.080	900			
R23AF8B	800	300	85	4960	5200	1.63	0.080	1100			
R23AF10A	1000	280	85	4775	5000	1.70	0.080	1000			
R23AF10B	1000	280	85	4775	5000	1.70	0.080	1200			
R23AF12A	1200	280	85	4775	5000	1.70	0.080	1000			
R23AF12B	1200	280	85	4775	5000	1.70	0.080	1200			
R23AF14A	1400	260	85	4530	4750	1.85	0.080	1250			
R23AF14B	1400	260	85	4530	4750	1.85	0.080	1500			
R23AF16A	1600	260	85	4530	4750	1.85	0.080	1250			
R23AF16B	1600	260	85	4530	4750	1.85	0.080	1500			
R23AF18A	1800	235	85	4400	4600	2.06	0.080	2000			
R23AF18B	1800	235	85	4400	4600	2.06	0.080	2400			
R23AF20A	2000	235	85	4400	4600	2.06	0.080	2000			
R23AF20B	2000	235	85	4400	4600	2.06	0.080	2400			
R23AF22A	2200	210	85	4000	4200	2.23	0.080	2750			
R23AF22B	2200	210	85	4000	4200	2.23	0.080	3300			
R23AF24A	2400	210	85	4000	4200	2.23	0.080	2750			
R23AF24B	2400	210	85	4000	4200	2.23	0.080	3300			

(1) 100% VRRM reapplied @ T_j = T_j max = 125°C.

(2) Double side cooled.

(3) T_j = 25°C.

(4) Cathode-to-stud. For anode-to-stud change "N" to "R" (eg. SD253N02S10P).

(5) For devices up to 1200 V, outline number is R13B; for devices with VRRM >= 1400 V, outline number is R14B.

(6) For reverse polarity, anode to stud, insert "R" before digit designating voltage code (R30DFR6A).

(7) For case outline drawing see page 169.

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times IF(AV)$ (V)	RthJC DC (2) (°C/W)	trr (3) (ns)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
SD303C02S05C	200	350	55	4850	5078	2.26	0.08	500	R18 B		DO-200AA
SD303C04S05C	400										
SD303C06S05C	600										
SD303C08S05C	800										
SD303C10S05C	1000										
SD303C02S10C	200										
SD303C04S10C	400										
SD303C06S10C	600										
SD303C08S10C	800										
SD303C10S10C	1000										
SD303C12S10C	1200										
SD303C14S10C	1400										
SD303C02S15C	200										
SD303C04S15C	400										
SD303C06S15C	600										
SD303C08S15C	800										
SD303C10S15C	1000										
SD303C12S15C	1200										
SD303C14S15C	1400										
SD303C16S15C	1600										
SD303C18S15C	1800										
SD303C20S15C	2000										
SD303C22S15C	2200										
SD303C02S20C	200										
SD303C04S20C	400										
SD303C06S20C	600										
SD303C08S20C	800										
SD303C10S20C	1000										
SD303C12S20C	1200										
SD303C14S20C	1400										
SD303C16S20C	1600										
SD303C18S20C	1800										
SD303C20S20C	2000										
SD303C22S20C	2200										
SD403C02S10C	200	430	55	5200	5445	1.83	0.08	1000			
SD403C04S10C	400										
SD403C06S10C	600										
SD403C08S10C	800										
SD403C10S10C	1000										
SD403C02S15C	200										
SD403C04S15C	400										
SD403C06S15C	600										
SD403C08S15C	800										
SD403C10S15C	1000										
SD403C12S15C	1200										
SD403C14S15C	1400										
SD403C02S20C	200										
SD403C04S20C	400										
SD403C06S20C	600										
SD403C08S20C	800										
SD403C10S20C	1000										
SD403C12S20C	1200										
SD403C14S20C	1400										
SD453N18S30	1800	450	70	6800	7000	1.97	0.110	300	R17 A		B-8
SD453N20S30	2000										
SD453N22S30	2200										
SD453N24S30	2400										
SD453N25S30	2500										
SD453N18S40	1800										
SD453N20S40	2000										
SD453N22S40	2200										
SD453N24S40	2400										
SD453N25S40	2500										
SD453N18S50	1800										
SD453N20S50	2000										
SD453N22S50	2200										
SD453N24S50	2400										
SD453N25S50	2500										

(1) 100% VRRM reapplied @ $T_j = T_{j \text{ max}} = 125^\circ\text{C}$.
(2) Double side cooled.

(3) $T_j = 25^\circ\text{C}$.

(4) For case outline drawing see page 169.



Rectifiers

Fast Recovery

410-845 Amps

International
IOR Rectifier

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_{F(AV)}$ (V)	R _{thJC} DC (2) (°C/W)	t _{rr} (3) (ns)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
SD603C02S05C	200	600	55	7000	7329	2.97	0.038	500	R20 B		B-43
SD603C04S05C	400							500			
SD603C06S05C	600							500			
SD603C08S05C	800							500			
SD603C10S05C	1000							500			
SD603C02S10C	200							1000			
SD603C04S10C	400							1000			
SD603C06S10C	600							1000			
SD603C08S10C	800							1000			
SD603C10S10C	1000							1000			
SD603C12S10C	1200							1000			
SD603C14S10C	1400							1000			
SD603C02S15C	200							1500			
SD603C04S15C	400							1500			
SD603C06S15C	600							1500			
SD603C08S15C	800							1500			
SD603C10S15C	1000							1500			
SD603C12S15C	1200							1500			
SD603C14S15C	1400							1500			
SD603C16S15C	1600							1500			
SD603C18S15C	1800							1500			
SD603C20S15C	2000							1500			
SD603C22S15C	2200							1500			
SD603C02S20C	200							2000			
SD603C04S20C	400							2000			
SD603C06S20C	600							2000			
SD603C08S20C	800							2000			
SD603C10S20C	1000							2000			
SD603C12S20C	1200							2000			
SD603C14S20C	1400							2000			
SD603C16S20C	1600							2000			
SD603C18S20C	1800							2000			
SD603C20S20C	2000							2000			
SD603C22S20C	2200							2000			
R30EF6A	600	595	85	9550	10000	1.67	0.038	900	R20 A		
R30EF6B	600	595	85	9550	10000	1.67		1100			
R30EF8A	800	595	85	9550	10000	1.67		900			
R30EF8B	800	595	85	9550	10000	1.67		1100			
R30EF10A	1000	560	85	9070	9500	1.75		1000			
R30EF10B	1000	560	85	9070	9500	1.75		1200			
R30EF12A	1200	560	85	9070	9500	1.75		1000			
R30EF12B	1200	560	85	9070	9500	1.75		1200			
R30EF14A	1400	520	85	8600	9000	1.92		1250			
R30EF14B	1400	520	85	8600	9000	1.92		1500			
R30EF16A	1600	520	85	8600	9000	1.92		1250			
R30EF16B	1600	520	85	8600	9000	1.92		1500			
R30EF18A	1800	465	85	8300	8700	2.12		2000			
R30EF18B	1800	465	85	8300	8700	2.12		2400			
R30EF20A	2000	465	85	8300	8700	2.12		2000			
R30EF20B	2000	465	85	8300	8700	2.12		2400			
R30EF22A	2200	410	85	7800	8200	2.34		2750			
R30EF22B	2200	410	85	7800	8200	2.34		3300			
R30EF24A	2400	410	85	7800	8200	2.34		2750			
R30EF24B	2400	410	85	7800	8200	2.34		3300			
SD803C02S10C	200	845	55	9500	9946	1.89	0.038	1000	R20 B		
SD803C04S10C	400							1000			
SD803C06S10C	600							1000			
SD803C08S10C	800							1000			
SD803C10S10C	1000							1000			
SD803C02S15C	200							1500			
SD803C04S15C	400							1500			
SD803C06S15C	600							1500			
SD803C08S15C	800							1500			
SD803C10S15C	1000							1500			
SD803C02S20C	200							2000			
SD803C04S20C	400							2000			
SD803C06S20C	600							2000			
SD803C08S20C	800							2000			
SD803C10S20C	1000							2000			
SD803C12S20C	1200							2000			
SD803C14S20C	1400							2000			




(1) 100% V_{RRM} reapplied @ T_j = T_j max = 125°C.

(2) Double side cooled.

(3) T_j = 25°C.

(4) For case outline drawing see page 169.

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times IF(AV)$ (V)	RthJC DC (2) (°C/W)	trr (3) (ns)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
SD703C18S30L	1800							300	R19		DO-200AB
SD703C20S30L	2000							300			
SD703C22S30L	2200							300			
SD703C24S30L	2400							300			
SD703C25S30L	2500							300			
SD703C18S40L	1800							400			
SD703C20S40L	2000							400			
SD703C22S40L	2200	700	55	6800	7000	1.97	0.045	400			
SD703C24S40L	2400							400			
SD703C25S40L	2500							400			
SD703C18S50L	1800							500			
SD703C20S50L	2000							500			
SD703C22S50L	2200							500			
SD703C24S50L	2400							500			
SD703C25S50L	2500							500			
R34BF6A	600	540		10500	11000	1.52		900			
R34BF6B	600	540		10500	11000	1.52		1100			
R34BF8A	800	540		10500	11000	1.52		900			
R34BF8B	800	540		10500	11000	1.52		1100			
R34BF10A	1000	520		10000	10500	1.60		1000			
R34BF10B	1000	520		10000	10500	1.60		1200			
R34BF12A	1200	520		10000	10500	1.60		1000			
R34BF12B	1200	520		10000	10500	1.60		1200			
R34BF14A	1400	480		9550	10000	1.70		1250			
R34BF14B	1400	480	85	9550	10000	1.70	0.050	1500			
R34BF16A	1600	480		9550	10000	1.70		1250			
R34BF16B	1600	480		9550	10000	1.70		1500			
R34BF18A	1800	430		9070	9500	1.88		2000			
R34BF18B	1800	430		9070	9500	1.88		2400			
R34BF20A	2000	430		9070	9500	1.88		2000			
R34BF20B	2000	430		9070	9500	1.88		2400			
R34BF22A	2200	385		8100	8500	2.05		2750			
R34BF22B	2200	385		8100	8500	2.05		3300			
R34BF24A	2400	385		8100	8500	2.05		2750			
R34BF24B	2400	385		8100	8500	2.05		3300			
R38BF6A	600	700		12400	13000	1.65		1000			
R38BF6B	600	700		12400	13000	1.65		1200			
R38BF8A	800	700		12400	13000	1.65		1000			
R38BF8B	800	700		12400	13000	1.65		1200			
R38BF10A	1000	670		11900	12500	1.73		1200			
R38BF10B	1000	670		11900	12500	1.73		1400			
R38BF12A	1200	670		11900	12500	1.73		1200			
R38BF12B	1200	670		11900	12500	1.73		1400			
R38BF14A	1400	620		11460	12000	1.85		1500			
R38BF14B	1400	620	85	11460	12000	1.85	0.035	1800			
R38BF16A	1600	620		11460	12000	1.85		1500			
R38BF16B	1600	620		11460	12000	1.85		1800			
R38BF18A	1800	555		10500	11000	2.03		2250			
R38BF18B	1800	555		10500	11000	2.03		2700			
R38BF20A	2000	555		10500	11000	2.03		2250			
R38BF20B	2000	555		10500	11000	2.03		2700			
R38BF22A	2200	500		9360	9800	2.22		3000			
R38BF22B	2200	500		9360	9800	2.22		3500			
R38BF24A	2400	500		9360	9800	2.22		3000			
R38BF24B	2400	500		9360	9800	2.22		3500			

(1) 100% VRRM reapplied @ $T_j = T_j \text{ max} = 125^\circ\text{C}$.

(2) Double side cooled.

(3) $T_j = 25^\circ\text{C}$.

(4) For case outline drawing see page 169.

Rectifiers

Fast Recovery

820-1150 Amps

International
IOR Rectifier

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times IF(AV)$ (V)	RthJC DC (2) (°C/W)	trr (3) (ns)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
R52KF6A	600	1150	85	19580	20500	1.55	0.023	1000	R21	(13)	DO-200AC
R52KF6B	600	1150		19580	20500	1.55		1200			
R52KF8A	800	1150		19580	20500	1.55		1000			
R52KF8B	800	1150		19580	20500	1.55		1200			
R52KF10A	1000	1100		19100	20000	1.65		1200			
R52KF10B	1000	1100		19100	20000	1.65		1400			
R52KF12A	1200	1100		19100	20000	1.65		1200			
R52KF12B	1200	1100		19100	20000	1.65		1400			
R52KF14A	1400	1020		17670	18500	1.75		1500			
R52KF14B	1400	1020		17670	18500	1.75		1800			
R52KF16A	1600	1020		17670	18500	1.75		1500			
R52KF16B	1600	1020		17670	18500	1.75		1800			
R52KF18A	1800	920		16200	17000	1.94		2250			
R52KF18B	1800	920		16200	17000	1.94		2700			
R52KF20A	2000	920		16200	17000	1.94		2250			
R52KF20B	2000	920		16200	17000	1.94		2700			
R52KF22A	2200	830		14800	15500	2.13		3000			
R52KF22B	2200	830		14800	15500	2.13		3500			
R52KF24A	2400	830		14800	15500	2.13		3000			
R52KF24B	2400	830		14800	15500	2.13		3500			
SD823C18S30C	1800	820	55	6800	7000	1.97	0.038	300	R18 B		DO-200AA
SD823C20S30C	2000							300			
SD823C22S30C	2200							300			
SD823C24S30C	2400							300			
SD823C25S30C	2500							300			
SD823C18S40C	1800							400			
SD823C20S40C	2000							400			
SD823C22S40C	2200							400			
SD823C24S40C	2400							400			
SD823C25S40C	2500							400			
SD823C18S50C	1800							500			
SD823C20S50C	2000							500			
SD823C22S50C	2200							500			
SD823C24S50C	2400							500			
SD823C25S50C	2500							500			
SD1053C16S20L	1600	1050	55	11100	11800	1.90	0.040	400	R19		DO-200AB
SD1053C18S20L	1800							400			
SD1053C20S20L	2000							400			
SD1053C22S20L	2200							400			
SD1053C24S20L	2400							400			
SD1053C25S20L	2500							400			

(1) 100% VRRM reapplied @ $T_j = T_j \text{ max} = 125^\circ\text{C}$.

(2) Double side cooled.

(3) $T_j = 25^\circ\text{C}$.

(4) For case outline drawing see page 169.

(13) U.S. standard.

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ I _{FM}		R _{thJC} DC (2)	t _{rr} (3)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)	(V)	(A)					
R18CF25AA	2500	70	85	1528	1600	2.8	400	0.25	2000	R11A	(13)	DO-205AC
R18SF25AA	2500	70	85	1528	1600	2.8	400	0.25	2000	R9A	(13)	DO-205AA
R23DF25AA	2500	130	80	3820	4000	3.6	800	0.15	3000	R14A	(13)	DO-205AB
R23AF25AA	2500	180	80	3820	4000	3.6	800	0.08	3000	R18B	(2) (13)	DO-200AA
R34BF45	4500	210	80	4500	4700	5.8	1000	0.050	4400	R19	(2) (13)	DO-200AB
R52KF45	4500	800	65	17000	17800	2.05	1000	0.023	5500	R21	(2) (13)	DO-200AC

 (1) No V_{RRM} reapplied @ T_j = T_j max = 125°C.

(2) Double side cooled.

 (3) T_j = 125°C.

(4) For case outline drawing see page 169.

(13) U.S. standard.

Fast Recovery Rectifier Die (7)

Die Part No. (8)	Dimensions Inches	Passivation	Current I _{F(AV)} (A) (9)	Voltage Range (V)	Notes	Equiv. Device Series
IR150LR-G	0.150	Silicone Rubber	16	100-1000	(10) (11)	6FL, 12FL, 16FL
IR180LR-G	0.180	Silicone Rubber	25	100-1000		—
IR210LR-G	0.210	Silicone Rubber	40	100-1000		40HFL, B40HFL, B40H2L
IR280LR-G	0.280	Silicone Rubber	70	100-1000		70HFL
IR350LR-G	0.350	Silicone Rubber	85	100-1000		85HFL, IRKDC/J/EL56-71
IR480LR-G	0.480	Silicone Rubber	90	100-1000		T40HFL, T70HFL T85HFL, TRKD/J/C/EL91

To specify voltage, add suffix to die part number as follows:

SUFFIX	5	10	20	40	60	80	100
V _{RRM}	50	100	200	400	600	800	1000

(7) For die outline drawing see page 190.

(8) Type listed have standard gold metallization on both sides (suffix "G"). Available with aluminum metallization on anode side. To specify change suffix "G" to "B" (e.g., IR150LR-B). For other different metallizations contact factory.

(9) Values strongly dependent on assembly details.

 (10) For voltages 50-600 V, t_{rr} = 200 ns available
 50-1000 V, t_{rr} ≥ 500 ns available } t_{rr} test conditions: I_{FM} = π • rated I_{F(AV)}; t_j = 25°C - dI_F/dt = 25A/μsec.

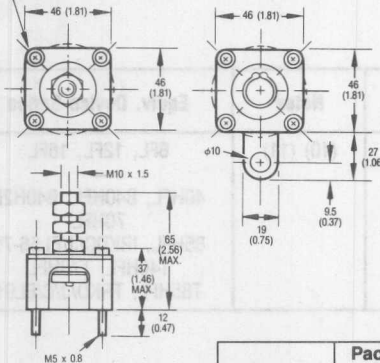
 (11) For t_{rr} = 200ns add S02 after -G ie IR150LR-GS02.
 For t_{rr} = 500ns add S05 after -G ie IR150LR-GS05.

Mounting Hardware

STUD & SIDE TERMINAL BOX CLAMPS

K22-0276 & -0323 K22-0287 & -0328

4 FIXING SCREWS ON A 50mm PITCH CIRCLE DIAMETER



The correct clamping force is achieved by tightening evenly the four retaining screws until the box makes contact with the heatsink.

Clamp	Package Size
K22-0276	'A'
K22-0287	'A'
K22-0323	'E'
K22-0328	'E'

LOW STUD PROFILE TERMINAL BOX CLAMPS

K22-0311 & K22-0346

Configuration similar to K22-0276 and K22-0323 respectively.

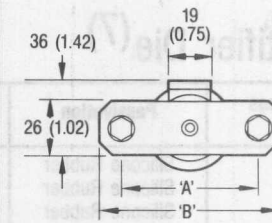
Clamp	Package Size
K22-0311	'A'
K22-0346	'E'

Terminal has M8 x 1.25 threads and is provided with one nut.

Max. height over terminal is 51 (2.01).

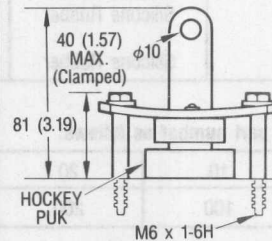
Height over heads of screws holding down box is 24 (0.94).

SINGLE SIDE MOUNTING CLAMPS FOR HOCKEY-PUK RECTIFIERS AND THYRISTORS



CLAMP	'A'	'B'
K22-0252	53 (2.09)	73 (2.87)

N.B. *CLAMP USES M8 SCREWS



Suitable for 'A' or 'E' size hockey puk diodes and thyristors.

A clamping force of 4450N (1000 lbs) is achieved by tightening down the spring so that it is flat and parallel to the heatsink.

Dimensions in Millimeters and (Inches)

Rectifiers

Standard Recovery

[illegible]

Rectifiers

Standard Recovery

750 mA-50 Amps

International
IOR Rectifier

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_{F(AV)}$ (V)	R _{thJC} DC (°C/W)	Case Outline Number (8)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
1N2069 1N2070 1N2071	200 400 600	0.75	25	21	22	1.2	0.25	R1	(5) (6)	DO-41 (DO-204AL)
1N2069A 1N2070A 1N2071A	200 400 600	0.75	25	21	22	1	0.25			
1N4001 1N4002 1N4003 1N4004 1N4005 1N4006 1N4007	50 100 200 400 600 800 1000	1	75	28	30	1.1	0.18			
10D05 10D1 10D2 10D4 10D6 10D8 10D10	50 100 200 400 600 800 1000	1.5	40	48	50	1.3	0.18			
1N4816 1N4817 1N4818 1N4819 1N4820 1N4821 1N4822 1N5052 1N5053 1N5054	50 100 200 300 400 500 600 700 800 1000	1.5	40	48	50	1.3				
20D05 20D1 20D2 20D4 20D6 20D8 20D10	50 100 200 400 600 800 1000	2	100	48	50	1.3				
40D1 40D2 40D4	100 200 400	4	120	190	200	1.1	10	R2	(5)	C-16
1N5401 1N5402 1N5404 1N5406 1N5407 1N5408	100 200 400 600 800 1000	3	105	191	200	1.2		R3	(6)	DO-201AD
21PT5 21PT10 21PT20 21PT40 21PT60	50 100 200 400 600	20	110	300	314	1.2	2	R4	(2) (3)	B-46
4AF05NPP 4AF1NPP 4AF2NPP 4AF4NPP	50 100 200 400	25	150	300	314	1.25	0.8	R5	(4) (7)	B-47PP
8AF05NPP 8AF1NPP 8AF2NPP 8AF4NPP	50 100 200 400	50	150	600	628	1.45	0.6			

(1) T_j = T_j max, 100% V_{RRM} reapplied.

(2) For T_C column read T_{tab}.

(3) For R_{thJC} column read R_{thJ}-tabs.

(4) Cathode to stud. For Anode to stud change "N" to "R" in Basic part number, e.g., 4AF4RPP etc.

(5) V_{FM} at rated I_{F(AV)}.

(6) Available on tape reel.

(7) Additional packages available.

(8) For case outline drawing see page 169.

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times I_F(AV)$ (V)	RthJC DC (°C/W)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
6F10 6F20 6F40 6F60 6F80 6F100 6F120	100 200 400 600 800 1000 1200	6	158	134	141	1.1	2.5	R6	(2) (3)	DO-203AA (DO-4)
12F10 12F20 12F40 12F60 12F80 12F100 12F120	100 200 400 600 800 1000 1200	12	144	225	235	1.26	2			
1N1199A 1N1200A 1N1201A 1N1202A 1N1203A 1N1204A 1N1205A 1N1206A 1N3670A 1N3671A 1N3672A 1N3673A	50 100 150 200 300 400 500 600 700 800 900 1000	12	150	230	240	1.35	2		(2)	
12F10B 12F20B 12F40B 12F60B 12F80B 12F100B 12F120B	100 200 400 600 800 1000 1200	12	146	285	300	1.2	2		(2) (3)	
16F10 16F20 16F40 16F60 16F80 16F100 16F120	100 200 400 600 800 1000 1200	16	140	295	310	1.23	1.6			
25F10 25F20 25F40 25F60 25F80 25F100 25F120	100 200 400 600 800 1000 1200	25	120	300	314	0.9	1.5			
1N3208 1N3209 1N3210 1N3211 1N3212 1N3213 1N3214	50 100 200 300 400 500 600	15	150	239	250	1.5	0.65	R7 A	(2) (4)	DO-203AB (DO-5)
1N1183 1N1184 1N1185 1N1186 1N1187 1N1188 1N1189 1N1190 1N3765 1N3766 1N3767 1N3768	50 100 150 200 300 400 500 600 700 800 900 1000	35	140	480 380	500 400	1.7 1.8	1		(2)	
40HF10 40HF20 40HF40 40HF60 40HF80 40HF100 40HF120 40HF140 40HF160	100 200 400 600 800 1000 1200 1400 1600	40	140 110	480	500	1.3	1		(2) (3) (5)	



- (1) $T_j = T_j$ max, 100% VRRM reapplied.
 (2) Cathode to stud. For Anode to stud add "R" to Basic part number (e.g., 12FR10, 40FR10, 1N3208R).
 (3) Available with metric stud; to specify add "M" to the end of part number (e.g., 6F10M, 40HF10M).
 (4) VFM for JEDEC type is registered value at max. T_j .
 (5) Leaded version available — to specify add "1" to second digit on part number (e.g., 41HF120).
 Leaded and sleeved version available — to specify add "2" to second digit on part number (e.g., 42HF120).


(6) For case outline drawing see page 169.

Rectifiers

Standard Recovery

40-85 Amps

International
IOR Rectifier

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times I_F(AV)$ (V)	RthJC DC (°C/W)	Case Outline Number (5)	Notes	Case Style					
		(A)	(°C)	50 Hz (A)	60 Hz (A)										
1N1183A 1N1184A 1N1185A 1N1186A 1N1187A 1N1188A 1N1189A 1N1190A	50 100 150 200 300 400 500 600	40	150	765	800	1.3	1.1	R7 A	(2)	DO-203AB (DO-5)					
1N2128A 1N2129A 1N2130A 1N2131A 1N2133A 1N2135A 1N2137A 1N2138A	50 100 150 200 300 400 500 600	60	140	860	900	1.3	0.65	R7 A	(2)						
70HF10 70HF20 70HF40 70HF60 70HF80 70HF100 70HF120 70HF140 70HF160	100 200 400 600 800 1005 1200 1400 1600	70	140	1000	1050	1.35	0.45		(2) (3) (4)						
110															
73HF10 73HF20 73HF40 73HF60 73HF80 73HF100 73HF120	100 200 400 600 800 1000 1200	70	140	1000	1050	1.35	0.45	R7 B	(2)						
110															
85HF10 85HF20 85HF40 85HF60 85HF80 85HF100 85HF120 85HF140 85HF160	100 200 400 600 800 1000 1200 1400 1600	85	140	1450	1500	1.2	0.35	R7 A	(2) (3) (4)						
110															
88HF10 88HF20 88HF40 88HF60 88HF80 88HF100 88HF120	100 200 400 600 800 1004 1200	85	140	1450	1500	1.2	0.35	R7 B	(2)						
110															



- (1) 100% VRRM reapplied.
- (2) Cathode to stud. For Anode to stud add "R" to Basic part number (e.g., 1N1183RA, 73HFR10, 85HFR10).
- (3) Leaded version available; to specify add "1" to second digit on part number (e.g., 71HF120, 86HF120).
Leaded and sleeved version available — to specify add "2" to second digit on part number (e.g., 72HFR120).
- (4) Available with metric stud: to specify add "M" to the end of part number (e.g., 70HF10M).
- (5) For case outline drawing see page 169.

Part Number	V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_F$ (AV) (V)	R _{thJC} DC (°C/W)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
1N3288A 1N3289A 1N3290A 1N3291A 1N3292B 1N3293A 1N3294A 1N3295A 1N3296A	100 200 300 400 500 600 800 1000 1200	100	130	2200	2300	1.5	0.4	R8 A	(5) (7) (8)	DO-205AA (DO-8)
150K5A 150K10A 150K20A 150K30A 150K40A 150K60A 150K80A 150K100A 150K120A	50 100 200 300 400 600 800 1000 1200	150	150	3000	3140	1.33	0.25		(5) (9)	
150K10AM 150K20AM 150K30AM 150K40AM 150K60AM 150K80AM 150K100AM 150K120AM	100 200 300 400 600 800 1000 1200	150	150	3000	3140	1.33	0.25		(5) (9)	
R18SG4A R18SG4B R18SG6A R18SG6B R18SG8A R18SG8B R18SG10A R18SG10B R18S12A R18S12B R18S14A R18S14B R18S16A R18S18A	400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1800	200 200 200 200 200 190 200 190 190 185 190 185 185 185	140	4950 4600 4950 4600 4600 4300 4600 4300 4300 3820 4300 3820 3820 3820	5200 4800 5200 4800 4800 4500 4800 4500 4500 4000 4500 4000 4000 4000	1.13 1.21 1.13 1.21 1.21 1.27 1.21 1.27 1.27 1.38 1.27 1.38 1.38 1.38	0.25		(5) (10) (11)	
								R9 A	(5) (11) (12)	
100HF20 100HF40 100HF60 100HF80 100HF100 100HF120 100HF140 100HF160	200 400 600 800 1000 1200 1400 1600	100	125	1500	1570	1.7	0.4	R10 A	(2) (4) (5)	DO-205AC (DO-30)
130HF20 130HF40 130HF60 130HF80 130HF100 130HF120 130HF140 130HF160	200 400 600 800 1000 1200 1400 1600	130	125	1680	1760	1.5	0.3			



- (1) $T_j = T_j$ max, 100% V_{RRM} reapplied.
- (2) Available with flat base, to specify add "F" at end of part number e.g. 100HF20F.
- (4) Available with metric stud: to specify add "M" at end of part number, e.g., 100HF20M.
- (5) Cathode to stud. For Anode to Stud add "R" to basic part number, e.g., R18SGR6A, 1N3291RA, 150KR10A.
- (6) For case outline drawing see page 169.
- (7) V_{FM} for JEDEC type is registered value at max T_J.
- (8) 1N3288 series is also available.
- (9) Also available with stud-topped case (152K...A) and flag terminal (154K...A).
- (10) Also Available with flag terminal; add "2" to standard part number: e.g., R18SG4A2 (outline R15).
- (11) Also available with stud-topped case; add "3" to standard part number: R18SG4A3.
- (12) Also available with flag terminal: add "2" to standard part number, e.g., R18S12A2 (outline R16).

Rectifiers

Standard Recovery


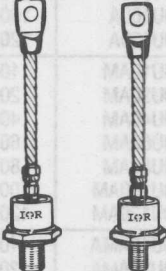

150-200 Amps

International
IOR Rectifier

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_{F(AV)}$ (V)	R _{thJC} DC (°C/W)	Case Outline Number (14)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
1N3111 1N3085 1N3086 1N3087 1N3088 1N3089 1N3090 1N3091 1N3092 1N5162	50 100 200 300 400 500 600 800 1000 1200	150	150	2850	3000	1.2	0.25	R10 A	(5) (7)	DO-205AC (DO-30)
150L5A 150L10A 150L20A 150L30A 150L40A 150L60A 150L80A 150L100A 150L120A	50 100 200 300 400 600 800 1000 1200	150	150	3000	3140	1.33	0.25		(5) (9)	
45L10 45L20 45L40 45L60 45L80 45L100 45L120	100 200 400 600 800 1000 1200	150	150	3000	3140	1.33	0.25		(2) (3) (5)	
SD150N02P SD150N04P SD150N06P SD150N08P SD150N10P SD150N12P SD150N14P SD150N16P SD150N18PC SD150N20PC SD150N22PC SD150N24PC SD150N26PC SD150N28PC SD150N30PC	200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000	150	125	2390	2500	1.6	0.27	R10 B R11 B	(4) (6)	
R18CG4A R18CG4B R18CG6A R18CG6B R18CG8A R18CG8B R18CG10A R18CG10B R18C12A R18C12B R18C14A R18C14B R18C16A R18C18A	400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1800	200 200 200 200 200 190 200 190 185 190 185 185 185 185	140	4950 4600 4950 4600 4600 4300 4600 4300 4300 3820 4300 3820 4000 3820	5200 4800 5200 4800 4800 4500 4800 4500 4500 4000 4500 4000 4000 4000	1.13 1.21 1.13 1.21 1.21 1.27 1.21 1.27 1.27 1.38 1.27 1.38 1.38 1.38	0.25	R10 A R10 B	(5) (10) (11) (5) (11) (12)	
SD200N02P SD200N04P SD200N06P SD200N08P SD200N12P SD200N14P SD200N16P SD200N18PC SD200N20PC SD200N24PC	200 400 600 800 1200 1400 1600 1800 2000 2400	200	115	3120	3265	1.50	0.27	R10 B R11 B	(4) (6)	



- (1) $T_j = T_j \text{ max}$, 100% V_{RRM} reapplied.
- (2) Available with flat base, to specify add "F", in basic part number as follows: 45LF.
- (3) Available with metric stud, to specify add "M" to end of basic part number, e.g. 45L120M.
- (4) Available with metric stud : to specify change "P" to "M" at the end of part number, e.g. SD200N14M etc.
- (5) Cathode to stud. For Anode to Stud add "R" to basic part number, e.g. 1N3735R, R18CGR4A.
- (6) Cathode to stud . For Anode to stud change "N" to "R" in basic part number , e.g. SD200R12P.
- (7) V_{FM} for JEDEC type is registered value at max T_j.
- (8) Also available with stud-topped case (152K...A, 152L...A), and flag terminal (154K...A, 154L...A).
- (9) Also Available with flag terminal; add "2" to standard part number : R18CG4A2 (outline R15).
- (10) Also available with stud-topped case; add "3" to standard part number: R18CG4A3.
- (11) Also available with flag terminal: add "2" to standard part number, e.g. R18C12A2 (outline R16).
- (14) For case outline drawing see page 169.

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_{F(AV)}$ (V)	R _{thJC} DC (°C/W)	Case Outline Number (8)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
150KS5 150KS10 150KS20 150KS30 150KS40 150KS60 150KS80 150KS100 150KS120	50 100 200 300 400 600 800 1000 1200	150	150	3000	3140	1.33	0.25	R12	(5)	B-42 
150HF10 150HF20 150HF40 150HF60 150HF80 150HF100 150HF120	100 200 400 600 800 1000 1200	150	125	2900	3000	1.54	0.22	R8B/R10B	(5) (9) (10)	DO-205AC (DO-30) DO-205AA (DO-8) 
200HF10 200HF20 200HF40 200HF60 200HF80 200HF100 200HF120	100 200 400 600 800 1000 1200	200	125	3700	3870	1.45	0.17			
1N3735 1N3736 1N3737 1N3738 1N3739 1N3740 1N3741 1N3742 1N3743	100 200 300 400 500 600 800 1000 1200	250	130	4300	4500	1.3	0.18	R13 A	(5) (7)	DO-205AB (DO-9) 
1N2054 1N2055 1N2057 1N2059 1N2061 1N2064 1N2066 1N2067 1N2068	50 100 200 300 400 600 800 900 1000	250	135	4300	4500	1.25	0.18			
1N4044 1N4045 1N4046 1N4047 1N4048 1N4049 1N4050 1N4051 1N4052 1N4053 1N4054 1N4055 1N4056	50 100 150 200 250 300 400 500 600 700 800 900 1000	275	120	4800	5000	1.35	0.18			
300HF20 300HF40 300HF60 300HF80 300HF100 300HF120 300HF140 300HF160	200 400 600 800 1000 1200 1400 1600	300	125	3800	4000	1.38	0.12			

- (1) T_j = T_j max, 100% V_{RRM} reapplied.
 (5) Cathode to stud. For Anode to Stud add "R" to basic part number, e.g. 1N3735R, 150HFR120.
 (7) V_{FM} for JEDEC type is registered value at max T_j.
 (8) For case outline drawing see page 169.
 (9) Available with flat base, to specify add "F" at end of part number e.g. 150HF120F.
 (10) Available with metric stud: to specify add "M" at end of part number e.g. 150HF120M.

Rectifiers

Standard Recovery



250–380 Amps

International
IOR Rectifier

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_{F(AV)}$ (V)	R _{thJC} DC (°C/W)	Case Outline Number (10)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
70U10 70U20 70U40 70U60 70U80 70U100 70U120	100 200 400 600 800 1000 1200	250	150	5500	5750	1.30	0.18	R13 A	(2) (4)	DO-205AB (DO-9)
								R13 B		
300U10A 300U20A 300U40A 300U60A 300U80A 300U100A 300U120A	100 200 400 600 800 1000 1200	300	130	5500	5750	1.40	0.18	R13 A		
300U10AM 300U20AM 300U40AM 300U60AM 300U80AM 300U100AM 300U120AM	100 200 400 600 800 1000 1200	300	130	5500	5750	1.40	0.18			
300U10AMA 300U20AMA 300U40AMA 300U60AMA 300U80AMA 300U100AMA 300U120AMA	100 200 400 600 800 1000 1200	300	130	5500	5750	1.40	0.18			
301U80 301U100 301U120 301U140 301U160 301U180 301U200 301U220 301U240 301U250	800 1000 1200 1400 1600 1800 2000 2200 2400 2500	300	120	5970	6265	1.62	0.15	R13 B	(3) (4) (9)	
								R14 B		
SD300N02PC SD300N04PC SD300N06PC SD300N08PC SD300N10PC SD300N12PC SD300N14PC SD300N16PC SD300N18PC SD300N20PC SD300N22PC SD300N24PC SD300N26PC SD300N28PC SD300N30PC	200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000	380	100	4030	4225	1.65	0.13	R13 B	(5) (6)	
								R14 B		



- (1) $T_j = T_j \text{ max}$, 100% V_{RRM} reapplied.
 (2) Available with flat base, to specify add "F" in basic Part Number as follows: 70UF... & 300UF...A.
 (3) Available with strengthening cone suitable for high "G" applications. To specify change "301" to "305" in part number, e.g., 305U200.
 (4) Cathode to stud. For Anode to Stud add "R" to basic part number, e.g., 70UR120, 300UR120A, 301UR120, R23DGR6A.
 (5) Cathode to stud. For Anode to stud change "N" to "R" in basic part number, e.g. SD300R12PC.
 (6) Available with metric stud: to specify change "P" to "M" at the end of part number, e.g. SD300N18M etc.
 (9) For reverse types: $I_{F(AV)} = 300 @ T_C = 135^\circ\text{C}$, $R_{thj-c} = 0.12^\circ\text{C/W}$ DC operation.
 (10) For case outline drawing see page 169.

Part Number	V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (1)		V _{FM} @ π × I _F (AV) (V)	R _{thJC} DC (°C/W)	Case Outline Number (9)	Notes	Case Style		
		(A)	(°C)	50 Hz (A)	60 Hz (A)							
R23DG4A	400	350	140	8600	9000	1.13	0.15	R13 A	(3) (4) (5)	DO-205AB (DO-9)		
R23DG4B	400	335	140	8000	8400	1.20						
R23DG6A	600	350	140	8600	9000	1.13						
R23DG6B	600	335	140	8000	8400	1.20						
R23DG8A	800	335	140	8000	8400	1.20						
R23DG8B	800	315	140	7650	8000	1.24						
R23DG10A	1000	335	140	8000	8400	1.20						
R23DG10B	1000	315	140	7650	8000	1.24						
R23D12A	1200	315	140	7650	8000	1.24						
R23D12B	1200	300	140	6880	7200	1.35						
R23D14A	1400	315	140	7650	8000	1.24						
R23D14B	1400	300	140	6880	7200	1.35						
R23D16A	1600	300	140	6880	7200	1.35						
R23D16B	1600	290	140	6500	6800	1.45						
R23D18A	1800	300	140	6880	7200	1.35						
R23D18B	1800	290	140	6500	6800	1.45						
R23D20A	2000	290	140	6500	6800	1.45						
R23D20B	2000	320	100	6200	6500	1.65						
R23D22A	2200	290	140	6500	6800	1.45						
R23D22B	2200	320	100	6200	6500	1.65						
R23D24A	2400	320	100	6200	6500	1.65						
R23D26A	2600	320	100	6200	6500	1.65						
SD400N02PC	200	400	120	5465	5720	1.45	0.13	R13 B	(6) (7)			
SD400N04PC	400											
SD400N06PC	600											
SD400N08PC	800											
SD400N10PC	1000											
SD400N12PC	1200											
SD400N14PC	1400											
SD400N16PC	1600											
SD400N18PC	1800	400	100	5465	5720	1.55	0.13	R14 B				
SD400N20PC	2000											
SD400N22PC	2200											
SD400N24PC	2400											
R30D4A	400	485	140	15800	16500	1.12	0.12	R17 B	(3) (4) (5)	B-8		
R30D4B	400	450	140	14700	15400	1.19						
R30D6A	600	485	140	15800	16500	1.12		R17 A				
R30D6B	600	450	140	14700	15400	1.19						
R30D8A	800	450	140	14700	15400	1.19						
R30D8B	800	425	140	13600	14200	1.24						
R30D10A	1000	450	140	14700	15400	1.19						
R30D10B	1000	425	140	13600	14200	1.24						
R30D12A	1200	425	140	13600	14200	1.24						
R30D12B	1200	415	140	12600	13200	1.30						
R30D14A	1400	425	140	13600	14200	1.24						
R30D14B	1400	415	140	12600	13200	1.30						
R30D16A	1600	415	140	12600	13200	1.30						
R30D16B	1600	400	140	12200	12800	1.38						
R30D18A	1800	415	140	12600	13200	1.30						
R30D18B	1800	400	140	12200	12800	1.38						
R30D20A	2000	400	140	12200	12800	1.38						
R30D20B	2000	450	100	11600	12200	1.45						
R30D22A	2200	400	140	12200	12800	1.38						
R30D22B	2200	450	100	11600	12200	1.45						
R30D24A	2400	450	100	11600	12200	1.45						
R30D24B	2400	425	100	11100	11700	1.50						
R30D26A	2600	450	100	11600	12200	1.45						
R30D26B	2600	425	100	11100	11700	1.50						
R30D28A	2800	425	100	11100	11700	1.50						
R30D30A	3000	425	100	11100	11700	1.50						
SD600N02P	200	600	80	900	9400	1.36	0.110	R17 A	(7) (8)			
SD600N04P	400											
SD600N06P	600											
SD600N08P	800											
SD600N10P	1000											
SD600N12P	1200											
SD600N14P	1400	600	70	7000	7300	1.47	0.110	R17 B				
SD600N16P	1600											
SD600N18PC	1800											
SD600N20PC	2000											
SD600N22PC	2200											
SD600N24PC	2400											

(1) $T_j = T_j \text{ max}$, 100% V_{RRM} reapplied.

(3) Available with stud-topped case; add "3" to standard part number: R30D4A3.

(4) Cathode-to-stud. For anode-to-stud add "R" before voltage code: R30DR4A.

(5) Also available with flat base; add "F" to standard part number: R30D4AF.

(6) Available with metric stud to specify change P to M SD400N22M.

(7) Cathode-to-stud. For Anode-to-stud change "N" to "R" in basic part number, e.g., SD600R12P.

(8) V_{FM} conditions: $I_{FM} = 1500A$, $T_j = 25^\circ C$.


(9) For case outline drawing see page 169.

Rectifiers

Standard Recovery

450-850 Amps

International
IOR Rectifier

Part Number	V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_F$ (AV) (V)	R _{thJC} DC (°C/W)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
470PDA10 470PDA20 470PDA40 470PDA60	100 200 400 600	470	103	5550	5760	1.60	0.10	R18 A	(2) (4)	DO-200AA
470PDAR10 470PDAR20 470PDAR40 470PDAR60	100 200 400 600	470	103	5550	5760	1.60	0.10		(2) (5)	
SD300C02C SD300C04C SD300C06C SD300C08C SD300C10C SD300C12C SD300C14C SD300C16C SD300C18C SD300C20C SD300C22C SD300C24C SD300C26C SD300C28C SD300C30C	200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000	650	55	4040	4225	2.0	0.09	R18 B	(2)	
R23A4A R23A4B R23A6A R23A6B R23A8A R23A8B R23A10A R23A10B R23A12A R23A12B R23A14A R23A14B R23A16A R23A16B R23A18A R23A18B R23A20A R23A20B R23A22A R23A22B R23A24A R23A26A	400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600 1800 1800 2000 2000 2200 2200 2400 2400	815 730 815 730 730 675 730 675 675 635 675 635 635 600 635 600 600 450 600 450 450 450		8600 8000 8600 8000 8000 7650 8000 7650 7650 6880 7650 6880 6880 6500 6880 6500 6500 6200 6500 6200 6200 6200	9000 8400 9000 8400 8400 8000 8400 8000 8000 7200 8000 7200 7200 6800 7200 6800 6800 6500 6800 6500 6500 6500	1.43 1.52 1.43 1.52 1.52 1.59 1.52 1.59 1.59 1.73 1.59 1.73 1.73 1.85 1.73 1.85 1.85 1.90 1.85 1.90 1.90 1.90		R18 A	(2)	
SD400C02C SD400C04C SD400C06C SD400C08C SD400C10C SD400C12C SD400C14C SD400C16C SD400C18C SD400C20C SD400C22C SD400C24C	200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400	800 (600)	55 (100)	5465	5720	1.80	0.09	R18 B	(2)	
		700	55	5465	5720	2.60	0.09			
SD800C34L SD800C36L SD800C38L SD800C40L SD800C42L SD800C44L SD800C45L	3400 3600 3800 4000 4200 4400 4500	850	85	10700	11300	1.85	0.040	R19		DO-200AB

(1) T_j = T_j max, 100% V_{RRM} reapplied.

(2) Double side cooled.

(4) Cathode-to-flange. Standard in Europe.

(5) Anode-to-flange. Standard in U.S.A.

(6) For case outline drawing see page 169.

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_{F(AV)}$ (V)	R _{thJC} DC (2) (°C/W)	Case Outline Number (3)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
SD1100C02C	200	1100	80	12200	12700	1.36	0.038	R20 B	(2) (3)	B-43
SD1100C04C	400									
SD1100C06C	600									
SD1100C08C	800									
SD1100C10C	1000									
SD1100C12C	1200									
SD1100C14C	1400									
SD1100C16C	1600	1100	70	10500	11000	1.47	0.038	R20 B	(2) (3)	B-43
SD1100C18C	1800									
SD1100C20C	2000									
SD1100C22C	2200									
SD1100C24C	2400									
R30E4A	400	1540	100	15800	16500	1.51	0.038	R20 A	(2) (3)	B-43
R30E4B	400	1380		14700	15400	1.61				
R30E6A	600	1540		15800	16500	1.51				
R30E6B	600	1380		14700	15400	1.61				
R30E8A	800	1380		14700	15400	1.61				
R30E8B	800	1290		13600	14200	1.70				
R30E10A	1000	1380		14700	15400	1.61				
R30E10B	1000	1290		13600	14200	1.70				
R30E12A	1200	1290		13600	14200	1.70				
R30E12B	1200	1220		12600	13200	1.86				
R30E14A	1400	1290		13600	14200	1.70				
R30E14B	1400	1220		12600	13200	1.86				
R30E16A	1600	1220		12600	13200	1.86				
R30E16B	1600	1160		12200	12800	2.01				
R30E18A	1800	1220		12600	13200	1.86				
R30E18B	1800	1160		12200	12800	2.01				
R30E20A	2000	1160		12200	12800	2.01				
R30E20B	2000	920		11600	12200	1.85				
R30E22A	2200	1160		12200	12800	2.01				
R30E22B	2200	920		11600	12200	1.85				
R30E24A	2400	920		11600	12200	1.85				
R30E24B	2400	875		11100	11700	1.85				
R30E26A	2600	920		11600	12200	1.85				
R30E26B	2600	875		11100	11700	1.85				
R30E28A	2800	875		11100	11700	1.85				
R30E30A	3000	875		11100	11700	1.85				



- (1) T_J = T_J max, 100% V_{RRM} reapplied.
 (2) Double side cooled.
 (3) For case outline drawing see page 169.

Rectifiers

Standard Recovery

820-1500 Amps

International
IOR Rectifier

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times I_F(AV)$ (V)	RthJC DC (2) (°C/W)	Case Outline Number (3)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
R34B4A	400	1470	100	18100	19000	1.34	0.050	R19		DO-200AB
R34B4B	400	1340		16700	17500	1.42				
R34B6A	600	1470		18100	19000	1.34				
R34B6B	600	1340		16700	17500	1.42				
R34B8A	800	1340		16700	17500	1.42				
R34B8B	800	1260		15650	16400	1.50				
R34B10A	1000	1340		16700	17500	1.42				
R34B10B	1000	1260		15650	16400	1.50				
R34B12A	1200	1260		15650	16400	1.50				
R34B12B	1200	1200		14900	15600	1.62				
R34B14A	1400	1260		15650	16400	1.50				
R34B14B	1400	1200		14900	15600	1.62				
R34B16A	1600	1200		14900	15600	1.62				
R34B16B	1600	1140		14800	15000	1.71				
R34B18A	1800	1200		14900	15600	1.62				
R34B18B	1800	1140		14800	15000	1.71				
R34B20A	2000	1140		14800	15000	1.71				
R34B20B	2000	850		13800	14500	1.75				
R34B22A	2200	1140		14800	15000	1.71				
R34B22B	2200	850		13800	14500	1.75				
R34B24A	2400	850		13800	14500	1.75				
R34B24B	2400	820		13300	14000	1.80				
R34B26A	2600	850		13800	14500	1.75				
R34B26B	2600	820		13300	14000	1.80				
R34B28A	2800	820		13300	14000	1.80				
R34B30A	3000	820		13300	14000	1.80				
SD1500C12L	1200	1500	55	13700	14500	1.49	0.040			
SD1500C14L	1400									
SD1500C16L	1600									
SD1500C18L	1800									
SD1500C20L	2000									
SD1500C22L	2200									
SD1500C24L	2400									
SD1500C26L	2600									
SD1500C28L	2800									
SD1500C30L	3000									



- (1) $T_j = T_j \text{ max}$, 100% VRRM reapplied.
 (2) Double side cooled.
 (3) For case outline drawing see page 169.

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (1)		V _{FM} @ $\pi \times I_{F(AV)}$ (V)	R _{thJC} DC (2) (°C/W)	Case Outline Number (3)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
R38B4A	400	1970		20100	21000	1.40		R19		DO-200AB
R38B4B	400	1780		18600	19500	1.48				
R38B6A	600	1970		20100	21000	1.40				
R38B6B	600	1780		18600	19500	1.48				
R38B8A	800	1780		18600	19500	1.48				
R38B8B	800	1670		18000	18900	1.55				
R38B10A	1000	1780		18600	19500	1.48				
R38B10B	1000	1670		18000	18900	1.55				
R38B12A	1200	1670		18000	18900	1.55				
R38B12B	1200	1590		16700	17500	1.68				
R38B14A	1400	1670		18000	18900	1.55				
R38B14B	1400	1590		16700	17500	1.68				
R38B16A	1600	1590		16700	17500	1.68				
R38B16B	1600	1510		15800	16500	1.78				
R38B18A	1800	1590		16700	17500	1.68				
R38B18B	1800	1510	100	15800	16500	1.78	0.035			
R38B20A	2000	1510		15800	16500	1.78				
R38B20B	2000	1130		14800	15500	1.80				
R38B22A	2200	1510		15800	16500	1.78				
R38B22B	2200	1130		14800	15500	1.80				
R38B24A	2400	1130		14800	15500	1.80				
R38B24B	2400	1090		13300	14000	1.80				
R38B26A	2600	1130		14800	15500	1.80				
R38B26B	2600	1090		13300	14000	1.80				
R38B28A	2800	1090		13300	14000	1.80				
R38B28B	2800	1040		12400	13000	2.10				
R38B30A	3000	1090		13300	14000	1.80				
R38B30B	3000	1040		12400	13000	2.10				
R38B32A	3200	1040		12400	13000	2.10				
R38B34A	3400	1040		12400	13000	2.10				
R38B36B	3600	900		11400	12000	2.10				
R38B38B	3800	900		11400	12000	2.10				
R38B40A	4000	900		11400	12000	2.10				
R38B42A	4200	900		11400	12000	2.10				
R38B44B	4400	850		10500	11000	2.20				
R38B46B	4600	850		10500	11000	2.20				
R38B48A	4800	850		10500	11000	2.20				
R38B50A	5000	850		10500	11000	2.20				
R52K4A	400	3280		31500	33000	1.32		R21		DO-200AC
R52K4B	400	2990		30100	31500	1.40				
R52K6A	600	3280		31500	33000	1.32				
R52K6B	600	2990		30100	31500	1.40				
R52K8A	800	2990		30100	31500	1.40				
R52K8B	800	2810		28700	30000	1.46				
R52K10A	1000	2990		30100	31500	1.40				
R52K10B	1000	2810		28700	30000	1.46				
R52K12A	1200	2810		28700	30000	1.46				
R52K12B	1200	2680	100	27600	28900	1.57	0.023			
R52K14A	1400	2810		28700	30000	1.46				
R52K14B	1400	2680		27600	28900	1.57				
R52K16A	1600	2680		27600	28900	1.57				
R52K16B	1600	2560		26700	28000	1.67				
R52K18A	1800	2680		27600	28900	1.57				
R52K18B	1800	2560		26700	28000	1.67				
R52K20A	2000	2560		26700	28000	1.67				
R52K20B	2000	1890		22400	23500	1.68				
R52K22A	2200	2560		26700	28000	1.67				
R52K22B	2200	1890		22400	23500	1.68				
R52K24A	2400	1890		22400	23500	1.68				
R52K24B	2400	1770		20500	21500	1.85				
R52K26A	2600	1890		22400	23500	1.68				
R52K26B	2600	1770		20500	21500	1.85				
R52K28A	2800	1770		20500	21500	1.85				
R52K28B	2800	1690		19550	20500	1.80				
R52K30A	3000	1770		20500	21500	1.85				
R52K30B	3000	1690		19550	20500	1.80				
R52K32A	3200	1690		19550	20500	1.80				
R52K34A	3400	1690		19550	20500	1.80				
R52K36B	3600	1460		17100	18000	1.95				
R52K38B	3800	1460		17100	18000	1.95				
R52K40A	4000	1460		17100	18000	1.95				
R52K42A	4200	1460		17100	18000	1.95				
R52K44B	4400	1320		15700	16500	2.00				
R52K46B	4600	1320		15700	16500	2.00				
R52K48A	4800	1320		15700	16500	2.00				
R52K50A	5000	1320		15700	16500	2.00				

(1) T_j = T_j max, 100% V_{RRM} reapplied.

(2) Double side cooled.

(3) For case outline drawing see page 169.

Rectifiers

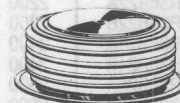
Standard Recovery





2950-7100 Amps

International
IR Rectifier

Part Number	VRRM (V)	IF(AV) @ Tc		IFSM (1)		VFM @ $\pi \times I_F(AV)$ (V)	RthJC DC (2) (°C/W)	Case Outline Number (3)	Notes	Case Style	
		(A)	(°C)	50 Hz (A)	60 Hz (A)					MINI	MAXI
R77R4A	400	7100	100	71600	75000	1.30	0.011	R22		B-44	
R77R4B	400	6470		67800	71000	1.37					
R77R6A	600	7100		71600	75000	1.30					
R77R6B	600	6470		67800	71000	1.37					
R77R8A	800	6470		67800	71000	1.37					
R77R8B	800	6100		66400	69500	1.45					
R77R10A	1000	6470		67800	71000	1.37					
R77R10B	1000	6100		66400	69500	1.45					
R77R12A	1200	6100		66400	69500	1.45					
R77R12B	1200	5800		63000	66000	1.55					
R77R14A	1400	6100		66400	69500	1.45					
R77R14B	1400	5800		63000	66000	1.55					
R77R16A	1600	5800		63000	66000	1.55					
R77R16B	1600	5500		60600	63500	1.63					
R77R18A	1800	5800		63000	66000	1.55					
R77R18B	1800	5500		60600	63500	1.63					
R77R20A	2000	5500		60600	63500	1.63					
R77R20B	2000	3870		56800	59500	1.70					
R77R22A	2200	5500		60600	63500	1.63					
R77R22B	2200	3870		56800	59500	1.70					
R77R24A	2400	3870		56800	59500	1.70					
R77R24B	2400	3800		52500	55000	1.75					
R77R26A	2600	3870		56800	59500	1.70					
R77R26B	2600	3800		52500	55000	1.75					
R77R28A	2800	3800		52500	55000	1.75					
R77R28B	2800	3740		48200	50500	1.75					
R77R30A	3000	3800		52500	55000	1.75					
R77R30B	3000	3740		48200	50500	1.75					
R77R32A	3200	3740		48200	50500	1.75					
R77R34A	3400	3740		48200	50500	1.75					
R77R36B	3600	3210		41000	43000	1.80					
R77R38B	3800	3210		41000	43000	1.80					
R77R40A	4000	3210		41000	43000	1.80					
R77R42A	4200	3210		41000	43000	1.80					
R77R44B	4400	2950		33400	35000	1.95					
R77R46B	4600	2950		33400	35000	1.95					
R77R48A	4800	2950		33400	35000	1.95					
R77R50A	5000	2950		33400	35000	1.95					

- (1) $T_j = T_j \text{ max, } 100\% V_{RRM} \text{ reapplied.}$
 (2) Double side cooled.
 (3) For case outline drawing see page 169.



Part Number	VRRM (V)	IF(AV) @ TC		IFSM (1)		VFM @ $\pi \times I_F(AV)$ (V)	RthJC DC (°C/W)	PR (2) (°C/W)	Case Outline Number (5)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
A6F40 A6F60 A6F80 A6F100 A6F120	400 600 800 1000 1200	6	158	134	141	1.10	2.50	4	R6	(3) (4)	DO-203AA (DO-4)
A12F40 A12F60 A12F80 A12F100 A12F120	400 600 800 1000 1200	12	144	225	235	1.26	2.00	7			
A16F40 A16F60 A16F80 A16F100 A16F120	400 600 800 1000 1200	16	140	295	310	1.23	1.60	15			
A25F40 A25F60 A25F80 A25F100 A25F120	400 600 800 1000 1200	25	120	300	314	0.90	1.5	10			
40HA40 40HA80 40HA100 40HA120 40HA140 40HA160	400 800 1000 1200 1400 1600	40	140 110	480	500	1.30	1.00	11	R7 A		DO-203AB (DO-5)
70HA40 70HA60 70HA80 70HA100 70HA120 70HA140 70HA160	400 600 800 1000 1200 1400 1600	70	140 110	1000	1050	1.35	0.45	20			

- (1) 100% VRRM reapplied.
 (2) 10 μ s square pulse, $T_J = T_J \text{ max}$.
 (3) Cathode-to-stud. For anode-to-stud, add "R" to basic Part number (e.g., A12FR100).
 (4) Available with metric stud; to specify add "M" to the end of part number (e.g., 40HA140M, A12F100M).
 (5) For case outline drawing see page 169.

Part Number (1)	Nominal V_Z @ $I_{ZT} = 1A$ (V)	Max. Power @ 1 ms (kW)	Power Rating		Max. Oper. Temperature (°C)	R_{thJC} (°C/W)	Case Outline Number (2)	Circuit Configuration	Case Style
			(W)	(°C)					
300Z34.5	34.5	30	300	127	175	0.18	R23		B-33
300Z50	50	30	300	127	175	0.18			
300Z75	75	30	300	127	175	0.18			
300Z100	100	30	300	127	175	0.18			
300Z150	150	30	300	127	175	0.18			
500PZA34.5	34.5	30	500	127	175	0.095	R18 A		DO-200AA
500PZA50	50	30	500	127	175	0.095			
500PZA75	75	30	500	127	175	0.095			
500PZA100	100	30	500	127	175	0.095			
500PZA150	150	30	500	127	175	0.095			
Z23ZA34.5	34.5	30	107	100	175	0.7	R25		B-67
Z23ZA50	50	30	107	100	175	0.7			
Z23ZA75	75	30	107	100	175	0.7			
Z23ZA100	100	30	107	100	175	0.7			
Z23ZA150	150	30	107	100	175	0.7			
ZD23ZB34.5	34.5	30	135	100	175	0.55	R24		B-65
ZD23ZB50	50	30	135	100	175	0.55			
ZD23ZB75	75	30	135	100	175	0.55			
ZD23ZB100	100	30	135	100	175	0.55			
ZD23ZB150	150	30	135	100	175	0.55			

(1) Basic number $\pm 20\%$ tolerance, A suffix $\pm 10\%$ tolerance, B suffix $\pm 5\%$ tolerance.

(2) For case outline drawing see page 169.

Die

Pre-Passivated Power Rectifier Die⁽¹⁾

Die Part No. (2)	Dimensions Square Inches	Passivation	Current $I_F(AV)$ (A)	Voltage Range (V)	Equiv. Device Series
IR150DR-G	0.150	Silicone Rubber	16	100-1200	6F, 12F, 16F
IR180DR-G	0.180	Silicone Rubber	25	100-2000	21PT, 4AF, 100JB, 250JB 36MB-A, P100, 26MT, P400
IR210DR-G	0.210	Silicone Rubber	40	100-2000	8AF, 40HF, High Voltage 100JB, 250JB, 35MB-A, 36HT B40HF, B40HH, B40D/J/C
IR230DR-G	0.230	Silicone Rubber	45	100-2000	—
IR280DR-G	0.280	Silicone Rubber	70	100-2000	70HF
IR350DR-G	0.350	Silicone Rubber	90	100-2000	85HF, IRKH/L41-56 IRKD/E56-71, T40HF, T70HF
IR480DR-G	0.480	Silicone Rubber	120	100-2000	IRKD/E91, IRKH/L71-91 T85HF, T110HF
IR520DR-G	0.520	Silicone Rubber	150	100-2000	200HF
IR590DR-G	0.590	Silicone Rubber	200	100-2000	300HF

To Specify Voltage, Add Suffix to Die Part Number as Follows:

SUFFIX	10	20	40	60	80	100	120	140	160	180	200
V_{RRM}	100	200	400	600	800	1000	1200	1400	1600	1800	2000

(1) For die outline drawing see page 190.

(2) Types listed have standard gold metallization on both sides, (suffix G). Available with aluminum metallization on anode side. To specify change suffix "G" to "B" (e.g., IR280DR-B). For other different metallizations contact factory.

Thyristors

Inverter Type

[illegible]

$T = T_{\text{max}} - 10^\circ \text{C}$

$\Delta_{\text{HCO}_3^-} = \text{total alkalinity} - [\text{HCO}_3^-] + [\text{H}^+] - [\text{OH}^-]$

3. For each author, determine the number of articles published in each journal.

Thyristors

Inverter Type

16-175 Amps RMS

International
IOR Rectifier

Part Number	VRRM VDRM (V)	I _T (RMS) (A)	I _T (AV) T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	t _q (μs) (4)	R _{th} JC DC (°C/W)	Case Outline Number (8)	Notes	Case Style																																																						
			(A)	(°C)	50 Hz (A)	60 Hz (A)																																																														
10RIF10W15 10RIF20W15 10RIF40W15 10RIF60W15 10RIF10W20 10RIF20W20 10RIF40W20 10RIF60W20	100 200 400 600 100 200 400 600	16	10	85	100	105	2.0	60	2.0	15 15 15 15 20 20 20 20	1.95	T1	(5) (7)	TO-208AA (TO-48)																																																						
16RIF10W15 16RIF20W15 16RIF40W15 16RIF60W15 16RIF10W20 16RIF20W20 16RIF40W20 16RIF60W20	100 200 400 600 100 200 400 600									25					16	85	200	209	2.0	60	2.0	15 15 15 15 20 20 20 20	1.15																																													
20RIF10W15 20RIF20W15 20RIF40W15 20RIF60W15 20RIF10W20 20RIF20W20 20RIF40W20 20RIF60W20	100 200 400 600 100 200 400 600																					32		20	85	250	261	2.0	60	2.0	15 15 15 15 20 20 20 20	0.92																																				
40RIF10W15 40RIF20W15 40RIF40W15 40RIF60W15 40RIF10W20 40RIF20W20 40RIF40W20 40RIF60W20	100 200 400 600 100 200 400 600																														63		40	85	700	733	2.5	150	2.40	15 15 15 15 20 20 20 20	0.35																											
50RIF10W15 50RIF20W15 50RIF40W15 50RIF60W15 50RIF10W20 50RIF20W20 50RIF40W20 50RIF60W20	100 200 400 600 100 200 400 600																																							80		50	85	1000	1047	2.5	150	2.0		0.35																		
S18CGF2A2 S18CGF2B2 S18CGF4A2 S18CGF4B2 S18CGF6A2 S18CGF6B2 S18CGF8A2 S18CGF8B2 S18CF10A2 S18CF10B2 S18CF12A2 S18CF12B2 S18CF14A2 S18CF14B2 S18CF16A2 S18CF16B2	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600																																																175		90 90 0 90 80 80 80 80 70 70 70 70 70 70 70 70	85	2390 2390 2390 2390 2000 2000 2000 2000 1910 1910 1910 1910 1910 1910 1910 1910	2500 2500 2500 2500 2100 2100 2100 2100 2000 2000 2000 2000 2000 2000 2000 2000	2.5	150	1.65 1.65 1.65 1.65 1.92 1.92 1.92 1.92 2.06 2.06 2.06 2.06 2.07 2.07 2.07 2.07	8 10 8 10 12 15 12 15 16 20 16 20 30 40 30 40	T7 B	(5) (7) (13)	TO-208AD (TO-83)							
																																																																			T8	(5) (7) (13)

(1) 100% VRRM reapplied @ T_j = T_j max. 125°C.

(2) T_j = 25°C.

(3) π × I_T(AV), T_j = 25°C.



(4) T_j = max. rated, reapplied dv/dt = 200V/μs.

(5) Leaded version available, to specify add "1" to second digit of part number (e.g., 11RIF10W15), see Outline T2.

(6) Leaded version available, to specify add "1" to second digit of part number (e.g., 41RIF60W15), see Outline T4.

(7) Available with metric stud on request, to specify add "M" to the end of part number (e.g., 50RIF60W15M).

(8) For case outline drawing see page 173.

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	t _q (μs)	R _{thJC} DC (°C/W)	Case Outline Number (10)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
ST083S02P.. ST083S02P.. ST083S04P.. ST083S04P.. ST083S06P.. ST083S06P.. ST083S08P.. ST083S08P.. ST083S10P.. ST083S10P.. ST083S12P.. ST083S12P..	200 200 400 400 600 600 800 800 1000 1000 1200 1200	135	80	85	2060	2160	3.0	200	2.16	10 to 20 15 to 30	0.195	T5 B	(4) (6)	TO-209AC (TO-94)
S18CGF2A0 S18CGF2B0 S18CGF4A0 S18CGF4B0 S18CGF6A0 S18CGF6B0 S18CGF8A0 S18CGF8B0 S18CF10A0 S18CF10B0 S18CF12A0 S18CF12B0 S18CF14A0 S18CF14B0 S18CF16A0 S18CF16B0	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600	175	90 90 90 80 80 80 80 70 70 70 70 70 70 70 70	85	2390 2390 2390 2390 2000 2000 2000 2000 1910 1910 1910 1910 1910 1910 1910 1910	2500 2500 2500 2500 2100 2100 2100 2100 2000 2000 2000 2000 2000 2000 2000 2000	2.5	150	1.65 1.65 1.65 1.65 1.92 1.92 1.92 1.92 2.06 2.06 2.06 2.06 2.07 2.07 2.07 2.07	8 10 8 10 12 15 12 15 16 20 16 20 30 40 30 40	0.25	T5 C T6 B	(5) (7) (5) (7)	
ST103S02P.. ST103S02P.. ST103S04P.. ST103S04P.. ST103S06P.. ST103S06P.. ST103S08P.. ST103S08P..	200 200 400 400 600 600 800 800	165	105	85	2530	2650	3.0	200	1.73	10 to 25	0.195		(4) (6)	
S23DGF2A0 S23DGF2B0 S23DGF4A0 S23DGF4B0 S23DGF6A0 S23DGF6B0 S23DGF8A0 S23DGF8B0 S23DF10A0 S23DF10B0 S23DF12A0 S23DF12B0 S23DF14A0 S23DF14B0 S23DF16A0 S23DF16B0	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600	370	170 170 170 170 150 150 150 150 135 135 135 135 135 135 135 135	85	4950 4950 4950 4950 4400 4400 4400 4400 3800 3800 3800 3800 3800 3800 3800 3800	5200 5200 5200 5200 4600 4600 4600 4600 4000 4000 4000 4000 4000 4000 4000 4000	2.5	150	1.60 1.60 1.60 1.60 1.86 1.86 1.86 1.86 1.97 1.97 1.97 1.97 1.99 1.99 1.99 1.99	8 10 8 10 12 15 12 15 16 20 16 20 30 40 30 40	0.14	T9 B T10B	(7) (9)	
ST173S06P.. ST173S06P.. ST173S08P.. ST173S08P.. ST173S10P.. ST173S10P.. ST173S12P.. ST173S12P..	600 600 800 800 1000 1000 1200 1200	275	175	85	3940	4120	3.0	200	2.07	15 to 30	0.105	T9A	(5) (6)	

 (1) 100% V_{RRM} reapplied @ T_j = T_j max. 125°C.

 (2) T_j = 25°C.

 (3) π × I_{T(AV)}, T_j = 25°C.

 (4) t_q: T_j = max rated, reapplied dV/dt = 20 V/μs.

 (5) t_q: T_j = max rated, reapplied dV/dt = 200 V/μs.

(6) Available with metric stud: to specify change "P" to "M" to the part number: (ST083S02MFJ).

 (7) Max. T_j = 125°C for standard types: High temperature types available with max T_j = 140°C for V_{RRM} ≤ 1200 V.

To specify insert "H" before voltage code: S18DGFH2B0.

(9) Available with flat base, to specify add "F" to part number: S23DGF2A0F.

(10) For case outline drawing see page 173.

Thyristors

Inverter Type


306-550 Amps RMS

International
IOR Rectifier

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	t _q (5) (μs)	R _{thJC} DC (°C/W)	Case Outline Number (9)	Notes	Case Style																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
			(A)	(°C)	50 Hz (A)	60 Hz (A)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
ST183S02P.. ST183S02P.. ST183S04P.. ST183S04P.. ST183S06P.. ST183S06P.. ST183S08P.. ST183S08P..	200 200 400 400 600 600 800 800	306	195	85	4120	4310	3.0	2.0	1.95	10 to 20	0.105	T9 A	(4) (6)	TO-209AB (TO-93)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
ST203S06P.. ST203S06P.. ST203S08P.. ST203S08P.. ST203S10P.. ST203S10P.. ST203S12P.. ST203S12P..	600 600 800 800 1000 1000 1200 1200														320	205	85	4420	4630	3.0	200	1.72	20 to 30	0.105	(5) (6)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
ST223S02P.. ST223S02P.. ST223S04P.. ST223S04P.. ST223S06P.. ST223S06P.. ST223S08P.. ST223S08P..	200 200 400 400 600 600 800 800																									345	220	85	4920	5150	3.0	200	1.58	10 to 30	0.105	(4) (6)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
ST333S02P.. ST333S02P.. ST333S04P.. ST333S04P.. ST333S06P.. ST333S06P.. ST333S08P.. ST333S08P..	200 200 400 400 600 600 800 800												518												330												75	9250	9700	3.0	200	1.51	10 to 30	0.10	(4) (6)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
S30DGF2A0 S30DGF2B0 S30DGF4A0 S30DGF4B0 S30DGF6A0 S30DGF6B0 S30DGF8A0 S30DGF8B0 S30DF10A0 S30DF10B0 S30DF12A0 S30DF12B0 S30DF14A0 S30DF14B0 S30DF16A0 S30DF16B0	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600																																			550										225	85	9450	9900	2.5	150	1.53 1.53 1.53 1.53 1.79 1.79 1.79 1.79 1.89 1.89 1.89 1.89 1.87 1.87 1.87 1.87	8 10 8 10 12 15 15 16 20 20 20 20 30 40 30 40	0.115	T11	(8) (10)	TO-209AE (TO-118)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
S34DGF2A0 S34DGF2B0 S34DGF4A0 S34DGF4B0 S34DGF6A0 S34DGF6B0 S34DGF8A0 S34DGF8B0 S34DF10A0 S34DF10B0 S34DF12A0 S34DF12B0 S34DF14A0 S34DF14B0 S34DF16A0 S34DF16B0	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600																																												550													280	85	11000	11400	2.5	1.50	1.50 1.50 1.50 1.50 1.77 1.77 1.77 1.77 1.86 1.86 1.86 1.86 1.83 1.83 1.83 1.83	8 10 8 10 12 15 15 16 20 20 20 20 30 40 30 40	0.095	T11	(8) (10)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

- (1) 100% V_{RRM} reapplied @ T_j = T_j max. 125°C.
 (2) T_j = 25°C.
 (3) π × I_{T(AV)}, T_j = 25°C.
 (4) t_q: T_j = max rated, reapplied dV/dt = 20 V/μs.
 (5) t_q: T_j = max rated, reapplied dV/dt = 200 V/μs.
 (6) Available with metric stud: to specify change "P" to "M" to the part number: (ST333S08MFJ).

- (7) Double side cooled.
 (8) Max. T_j = 125°C for standard types: High temperature types available with max T_j = 140°C for V_{RRM} ≤ 1200 V. To specify insert "H" before voltage code: S30DGFH2B0 (B types only).
 (9) For case outline drawing see page 173.
 (10) Available with flat base, to specify add "F" to part number: S30DGF2A0F.
 (11) R_{thJ-HS} DC operation double side cooled.

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	t _q (5) (μs)	R _{thJC} DC (7) (°C/W)	Case Outline Number (9)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
ST083C02C ST083C02C ST083C04C ST083C04C ST083C06C ST083C06C ST083C08C ST083C08C ST083C10C ST083C10C ST083C12C ST083C12C	200 200 400 400 600 600 800 800 1000 1000 1200 1200	410	200	55	2060	2160	3.0	200	2.16	10 to 20 15 to 30	0.10	T13 A	(4) (7) (11)	TO-200AB (A-PUK)
ST103C02C ST103C02C ST103C04C ST103C04C ST103C06C ST103C06C ST103C08C ST103C08C	200 200 400 400 600 600 800 800	500	240	55	2530	2650	3.0	200	1.74	10 to 25	0.10		(4) (11)	
ST173C06C ST173C06C ST173C08C ST173C08C ST173C10C ST173C10C ST173C12C ST173C12C	600 600 800 800 1000 1000 1200 1200	610	330	55	3940	4120	3.0	200	2.07	15 to 30	0.08		(5) (11)	
ST183C02C ST183C02C ST183C04C ST183C04C ST183C06C ST183C06C ST183C08C ST183C08C	200 200 400 400 600 600 800 800	690	370	55	4120	4310	3.0	200	1.96	10 to 20	0.08		(5) (11)	
ST203C06C ST203C06C ST203C08C ST203C08C ST203C10C ST203C10C ST203C12C ST203C12C	600 600 800 800 1000 1000 1200 1200	700	370	55	4420	4630	3.0	200	1.72	20 to 30	0.08	T13 B	(5) (11)	
ST223C02C ST223C02C ST223C04C ST223C04C ST223C06C ST223C06C ST223C08C ST223C08C	200 200 400 400 600 600 800 800	745	390	55	4920	5150	3.0	200	1.58	10 to 30	0.08		(4) (11)	
S23AF2A S23AF2B S23AF4A S23AF4B S23AF6A S23AF6B S23AF8A S23AF8B S23AF10A S23AF10B S23AF12A S23AF12B S23AF14A S23AF14B S23AF16A S23AF16B	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600	500 500 500 500 430 430 430 430 380 380 380 380 380 380 380 380	315 315 315 315 275 275 275 275 240 240 240 240 240 240 240 240	70	4950 4950 4950 4950 4400 4400 4400 4400 3800 3800 3800 3800 3800 3800 3800 3800	5200 5200 5200 5200 4600 4600 4600 4600 4000 4000 4000 4000 4000 4000 4000 4000	2.5	150	1.83 1.83 1.83 1.83 2.14 2.14 2.14 2.14 2.37 2.37 2.37 2.37 2.41 2.41 2.41 2.41	8 10 8 10 12 15 12 15 16 20 16 20 30 40 30 40	0.085	(8)		




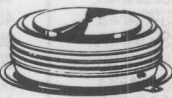
Notes: Please see notes on page 80.

Thyristors

Inverter Type

715-2060 Amps RMS

International
IOR Rectifier

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	t _q (5) (μs)	R _{thJC} DC (7) (°C/W)	Case Outline Number (10)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
ST303C02C ST303C04C ST303C06C ST303C08C ST303C10C ST303C12C	200 400 600 800 1000 1200	1180	620	55	6690	7000	3	200	2.16	10 to 20 15 to 30	0.040	T14 A	(11)	TO-200AB (E-PUK)
ST333C02C ST333C04C ST333C06C ST333C08C	200 200 400 400 600 600 800 800	1435	720	55	9250	9700	3.0	200	1.96	10 to 30	0.040		(4) (11)	
S30EF2A S30EF2B S30EF4A S30EF4B S30EF6A S30EF6B S30EF8A S30EF8B S30EF10A S30EF10B S30EF12A S30EF12B S30EF14A S30EF14B S30EF16A S30EF16B	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600	970 970 970 970 850 850 850 850 740 740 740 740 750 750 750 750	620 620 620 620 540 540 540 540 470 470 470 470 480 480 480 480	70	9450 9450 9450 9450 8100 8100 8100 8100 7350 7350 7350 7350 7350 7350 7350 7350	9900 9900 9900 9900 8500 8500 8500 8500 7700 7700 7700 7700 7700 7700 7700 7700	2.5	150	1.90 1.90 1.90 1.90 2.23 2.23 2.23 2.23 2.45 2.45 2.45 2.45 2.43 2.43 2.43 2.43	8 10 8 10 12 15 12 15 16 20 15 20 30 40 30 40	0.040	T14 B	(8)	
S34BF2A S34BF2B S34BF4A S34BF4B S34BF6A S34BF6B S34BF8A S34BF8B S34BF10A S34BF10B S34BF12A S34BF12B S34BF14A S34BF14B S34BF16A S34BF16B	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600	935 935 935 935 825 825 825 825 715 715 715 715 740 740 740 740	595 595 595 595 525 525 525 525 455 455 455 455 470 470 470 470	70	11000 11000 11000 11000 9350 9350 9350 9350 8600 8600 8600 8600 8600 8600 8600 8600	11400 11400 11400 11400 9800 9800 9800 9800 9000 9000 9000 9000 9000 9000 9000 9000	2.5	150	1.72 1.72 1.72 1.72 2.02 2.02 2.02 2.02 2.19 2.19 2.19 2.19 2.16 2.16 2.16 2.16	8 10 8 10 12 15 12 15 16 20 16 20 30 30 30 40	0.050	T15	(8)	
S38BF2B S38BF4B S38BF6B S38BF8B S38BF10B S38BF12B S38BF14B S38BF16B S38BF18B S38BF20B	200 400 600 800 1000 1200 1400 1600 1800 2000	1290 1290 1140 1140 980 980 1015 1015 930 930	820 820 725 725 625 625 645 645 590 590	70	15000 15000 13500 13500 12000 12000 12000 12000 10500 10500	16000 16000 14000 14000 12500 12500 12500 12500 11000 11000	2.5	150	1.76 1.76 2.08 2.08 2.25 2.25 2.25 2.25 2.30 2.30	10 10 15 15 20 20 40 40 60 60	0.035			
S52KF2B S52KF4B S52KF6B S52KF8B S52KF10B S52KF12B S52KF14B S52KF16B S52KF18B S52KF20B	200 400 600 800 1000 1200 1400 1600 1800 2000	2060 2060 1820 1820 1590 1590 1640 1640 1500 1500	1310 1310 1160 1160 1010 1010 1040 1040 960 960	70	26500 26500 22500 22500 21500 21500 21000 21000 19000 19000	27500 27500 23500 23500 22500 22500 22000 22000 20000 20000	2.5	200	1.72 1.72 2.03 2.03 2.20 2.20 2.18 2.18 2.25 2.25	10 10 15 15 20 20 40 40 60 60	0.023	T16	(9)	A-24 

(1) 100% V_{RRM} reapplied @ T_j = T_j max. 125°C.

(2) T_j = 25°C.

(3) $\pi \times I_T(AV)$, T_J = 25°C.

(4) t_q: T_j = max rated, reapplied dV/dt = 20 V/μs.

(5) t_q: T_j = max rated, reapplied dV/dt = 200 V/μs.

(7) Double side cooled.

(8) Max. T_j = 125°C for standard types: High temperature types available with max T_j = 140°C for V_{RRM} < = 1200 V. To specify insert "H" before voltage code: S34BFH2B0 (B types only).

(9) Max. T_j = 125°C.

(10) For case outline drawing see page 173.

(11) R_{thJ}-HS DC double side cooled.

Thyristors

Phase Control Type

[illegible]

Thyristors

Phase Control Type

25-80 Amps RMS

International
IOR Rectifier

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} @ T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	dv/dt (4) (V/μs)	R _{thJC} DC (°C/W)	Case Outline Number (11)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
10RIA10 10RIA20 10RIA40 10RIA60 10RIA80 10RIA100 10RIA120	100 200 400 600 800 1000 1200	25	10	85	190	200	2.0	60	1.75	300	1.85	T1	(5) (6)	TO-208AA (TO-48)
2N681 2N682 2N683 2N684 2N685 2N686 2N687 2N688 2N689 2N690 2N691 2N692	25 50 100 150 200 250 300 400 500 600 700 800												(6)	
16RIA10 16RIA20 16RIA40 16RIA60 16RIA80 16RIA100 16RIA120 16RIA140 16RIA160	100 200 400 600 800 1000 1200 1400 1600	35	16	85	285	300	2.0	60	1.75	300	1.15		(5) (6)	
2N5204 2N5205 2N5206 2N5207	600 800 1000 1200	35	22	40	285	300	2.0	40	2.30	250	1.50		(6)	
22RIA10 22RIA20 22RIA40 22RIA60 22RIA80 22RIA100 22RIA120 22RIA140 22RIA160	100 200 400 600 800 1000 1200 1400 1600	35	22	85	335	355	2.0	60	1.70	300	0.86		(5) (6)	
25RIA10 25RIA20 25RIA40 25RIA60 25RIA80 25RIA100 25RIA120 25RIA140 25RIA160	100 200 400 600 800 1000 1200 1400 1600	40	25	85	350	370	2.0	60	1.70	300	0.75			
50RIA10 50RIA20 50RIA40 50RIA60 50RIA80 50RIA100 50RIA120 50R1A140 50R1A160	100 200 400 600 800 1000 1200 1400 1600	80	50	94	1200	1255	2.5	100	1.60	500	0.35	T3	(6) (7)	TO-208AC (TO-65)



- (1) 100% V_{RRM} reapplied @ T_j = T_j max. 125°C.
 (2) T_j = 25°C.
 (3) $\pi \times I_T(AV)$ @ T_J = 25°C.
 (4) Exponential to 0.67 V_{DRM}; T_J = 125°C.
 (5) Leaded version available, to specify add "1" to second digit in part number (e.g., 11RIA10, 17RIA10, 23RIA10), outline T2.

- (6) Available with metric stud; to specify add "M" to the end of part number (e.g., 25RIA120M, 50RIA120M).
 (7) Leaded version available, to specify add "1" to second digit in part number (e.g., 51RIA10), outline T4.
 (8) Available with Faston, to specify add "1" to second digit in part number (e.g., 71RIA10).
 (9) Flag terminal available, to specify add "2" to second digit in part number (e.g., 72RIA10), outline T7.

- (10) dv/dt: exponential to 100% V_{DRM}; T_j = 125°C
 (11) For case outline drawing see page 173.
 (12) Available with eyelet terminal as 80RK1 series.

Part Number	VRRM VDRM (V)	IT(RMS) (A)	IT(AV) @ Tc		ITSM (1)		VGT (2) (V)	IGT (2) (mA)	VTM (3) (V)	dv/dt (4) (V/μs)	RthJC DC (°C/W)	Case Outline Number (11)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
2N1792	50	110	70	65	955	1000	2.5	70	1.85	200	0.40	T7 A	(6) (10)	TO-208AD (TO-83)
2N1793	100													
2N1794	150													
2N1795	200													
2N1796	250													
2N1797	300													
2N1798	400													
2N1799	500													
2N1800	600													
2N1801	700													
2N1802	800													
2N1803	900							110	2.00					
2N1804	1000							110	2.00					
2N3091	600	110	70	62	955	1000	2.5	110	1.85	20	0.40	T5 A		TO-209AC (TO-94)
2N3092	700													
2N3093	800													
2N3094	900													
2N3095	1000													
2N3096	1100													
2N3097	1200													
2N3098	1300													
2N1909	25	110	70	62	955	1000	2.5	70	1.85	200	0.40			
2N1910	50													
2N1911	100													
2N1912	150													
2N1913	200													
2N1914	250													
2N1915	300													
2N1916	400													
2N1805	500													
2N1806	600													
2N1807	700													
70RIA10	100	110	70	80	1200	1255	2.5	100	1.80	500	0.35		(6) (8) (9)	
70RIA20	200													
70RIA40	400													
70RIA60	600													
70RIA80	800													
70RIA100	1000													
70RIA120	1200													
2N2023	25	110	70	85	955	1000	2.0	70	1.90	50	0.40		(6) (10)	
2N2024	50													
2N2025	100													
2N2026	150													
2N2027	200													
2N2028	250													
2N2029	300													
2N2030	400													
80RIA10	100	125	80	91	1590	1667	2.5	120	1.40	500	0.30		(6) (8) (9)	
80RIA20	200													
80RIA40	400													
80RIA60	600													
80RIA80	800													
80RIA100	1000													
80RIA120	1200													
81RK10	100	125	80	90	1600	1700	2.0	100	1.6	500	0.35		(6) (9) (12)	
81RK20	200													
81RK40	400													
81RK60	600													
81RK180	800													
81RK100	1000													
81RK120	1200													



Notes: Please see notes on page 84.


Thyristors


Phase Control Type

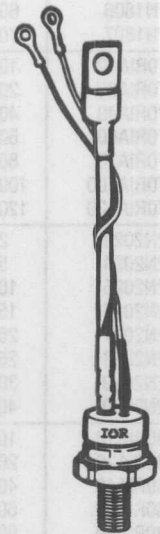
140-175 Amps RMS

International
IOR Rectifier

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} @ T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	dv/dt (4) (V/μs)	R _{thJC} DC (°C/W)	Case Outline Number (11)	Notes	Case Style																					
			(A)	(°C)	50 Hz (A)	60 Hz (A)																													
S15CG2A2 S15CG2B2 S15CG4A2 S15CG4B2 S15CG6A2 S15CG6B2 S15CG8A2 S15CG8B2 S15CG10A2 S15CG12A2	200 200 400 400 600 600 800 800 1000 1200	140	90	95 91 95 91 91 89 91 89 89 89	2960 2630 2960 2630 2630 2390 2630 2390 2390 2390	3100 2750 3100 2750 2750 2500 2750 2500 2500 2500	2.5	70 70 70 70 70 150 70 150 150 150	1.17 1.27 1.17 1.27 1.27 1.36 1.27 1.36 1.36 1.37	500	0.28	T7B	(5)	TO-208AD (TO-83)																					
S18CG2A2 S18CG2B2 S18CG4A2 S18CG4B2 S28CG6A2 S18CG6B2 S18CG8A2 S28CG8B2 S18C10A2 S18C10B2 S18C12A2 S18C12B2 S18C14A2 S18C16A2	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1600			110 110 110 110 110 105 110 105 105 100 105 100 100 100	90 85 90 85 85 85 85 85 85 85 85 85 85 85	2960 2630 2960 2630 2630 2390 2630 2390 2390 2250 2390 2350 2350 2350		3100 2750 3100 2750 2750 2500 2750 2500 2500 2350 2500 2350 2350 2350	2.5						150	1.22 1.33 1.22 1.33 1.33 1.42 1.33 1.42 1.42 1.50 1.42 1.50 1.50 1.50	500	0.25																	
															T8	(8) (5) (8) (8) (8)																			
S15CG2A0 S15CG2B0 S15CG4A0 S15CG4B0 S15CG6A0 S15CG6B0 S15CG8A0 S15CG8B0 S15CG10A0 S15CG12A0	200 200 400 400 600 600 800 800 1000 1200			140	90	95 91 95 91 91 89 91 89 89 89		2960 2630 2960 2630 2630 2390 2630 2390 2390 2390							3100 2750 3100 2750 2750 2500 2750 2500 2500 2500	2.5			70 70 70 70 70 150 70 150 150 150	1.17 1.27 1.17 1.27 1.27 1.36 1.27 1.36 1.36 1.36	500	0.28	T5 C	(5)	TO-209AC (TO-94)										
111RKI10 111RKI20 111RKI40 111RKI60 111RKI80 111RKI100 111RKI120	100 200 400 600 800 1000 1200					110 110 110 110 110 110 110		90 90 90 90 90 90 90							1750 1830 1750 1830 1750 1830 1750				2.0 2.0 2.0 2.0 2.0 2.0 2.0	100 100 100 100 100 100 100						1.52 1.52 1.52 1.52 1.52 1.52 1.52	T5 A	(6) (12) (13)							
110RIA10 110RIA20 110RIA40 110RIA60 110RIA80 110RIA100 110RIA120	100 200 400 600 800 1000 1200					110 110 110 110 110 110 110		90 90 90 90 90 90 90							2150 2250 2150 2250 2150 2250 2150				3.0 3.0 3.0 3.0 3.0 3.0 3.0	150 150 150 150 150 150 150						1.52 1.52 1.52 1.52 1.52 1.52 1.52			T5 B	(7)					
ST110S02P.. ST110S04P.. ST110S06P.. ST110S08P.. ST110S10P.. ST110S12P.. ST110S14P..	200 400 600 800 1000 1200 1400					175		110							90 90 90 90 90 90 90				2150 2250 2150 2250 2150 2250 2150	2250 2150 2250 2150 2250 2150 2250						3.0					150 150 150 150 150 150 150	1.52 1.52 1.52 1.52 1.52 1.52 1.52	400	0.23	T6 A







(1) 100% V_{RRM} reapplied @ T_j = T_j max. 125°C.

(2) T_j = 25°C.

(3) π × I_{T(AV)} @ T_j = 25°C.

(4) Linear to 0.8 V_{DRM}; T_j = 125°C.

(5) Max. T_j = 125°C for standard types: High temperature types available with max. T_j = 150°C for V_{RRM} ≤ 1200V. Insert "H" before voltage code: S15CGH2A0.

(6) Available with metric stud; to specify add "M" to the end of part number (e.g., 111RKI40M).

(7) Available with metric stud; change "P" to "M" at end of part number: ST110S10M.

(8) Max. T_j = 125°C.

(9) Available with eyelet terminal as 80RKI series.

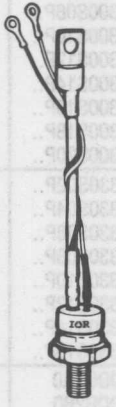

(10) Flag terminal available, to specify change second digit to "2" in part number (e.g. 82RKI120), Outline T7.

(11) For case outline drawing see page 173.

(12) 111RKI Series has Faston terminal for eyelet terminal order as 110RKI Series.

(13) Flag terminal available, to specify change third digit in part number to "2" (e.g., 112RKI10), Outline T7.

(14) Available with flat base: to specify add "F" to the end of part number: S23D20A0F.

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} @ T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	dv/dt (4) (V/μs)	R _{thJC} DC (°C/W)	Case Outline Number (9)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
ST110S16P..	1600	175	110	90	2270	2380	3.0	150	1.52	400	0.195	T6A		TO-209AC (T0-94) 
S18CG2A0	200	175	110	90	2960	3100	2.5	150	1.22	500	0.25	T5 C	(5)	
S18CG2B0	200		110	85	2630	2750			1.33					
S18CG4A0	400		110	90	2960	3100			1.22					
S18CG4B0	400		110	85	2630	2750			1.33					
S18CG6A0	600		110	85	2630	2750			1.33					
S18CG6B0	600		105	85	2390	2500			1.42					
S18CG8A0	800		110	85	2630	2750			1.33					
S18CG8B0	800		105	85	2390	2500			1.42					
S18C10A0	1000		105	85	2390	2500			1.42			T6 B		
S18C10B0	1000		100	85	2250	2350			1.50				(8)	
S18C12A0	1200		105	85	2390	2500			1.42				(5)	
S18C12B0	1200		100	85	2250	2350			1.50				(8)	
S18C14A0	1400		100	85	2250	2350			1.50				(8)	
S18C16A0	1600		100	85	2250	2350			1.50				(8)	
181RK120	200	285	180	80	3500	3660	2.5	150	1.35	500	0.15	T9 A	(6)	
181RK140	400												(12)	
181RK160	600												(13)	
181RK180	800													
181RK100	1000													
ST180S02P..	200	314	200	85	4200	4400	3.0	150	1.72	400	0.105	T9 A	(7)	TO-209AB (T0-93) 
ST180S04P..	400													
ST180S06P..	600													
ST180S08P..	800													
ST180S10P..	1000													
ST180S12P..	1200											T10 A		
ST180S14P..	1400													
ST180S16P..	1600													
ST180S18P..	1800													
ST180S20P..	2000													
ST230S02P..	200	360	230	85	4800	5000	3.0	150	1.50	400	0.10	T9 A		
ST230S04P..	400													
ST230S06P..	600													
ST230S08P..	800													
ST230S10P..	1000													
ST230S12P..	1200											T10 A		
ST230S14P..	1400													
ST230S16P..	1600													
S23DG2A0	200	370	235	85	6600	6900	2.5	150	1.22	500	0.14	T9 B	(5) (14)	
S23DG2B0	200		215		6100	6400			1.30					
S23DG4A0	400		235		6600	6900			1.22					
S23DG4B0	400		215		6100	6400			1.30					
S23DG6A0	600		215		6100	6400			1.30					
S23DG6B0	600		200		5350	5600			1.38					
S23DG8A0	800		215		6100	6400			1.30					
S23DG8B0	800		200		5350	5600			1.38			T10 B		
S23D10A0	1000		200		5350	5600			1.38					
S23D10B0	1000		190		4950	5200			1.44				(8) (14)	
S23D12A0	1200		200		5350	5600			1.38				(5) (14)	
S23D12B0	1200		190		4950	5200			1.44				(8) (14)	
S23D14A0	1400		190		4950	5200			1.44					
S23D14B0	1400		180		4600	4800			1.53					
S23D16A0	1600		190		4950	5200			1.44					
S23D16B0	1600		180		4600	4800			1.53					
S23D18A0	1800		180		4600	4800			1.53					
S23D20A0	2000		180		4600	4800			1.53					
ST280S02P..	200	440	280	85	6600	6900	3.0	150	1.28	400	0.105	T9 A		
ST280S04P..	400													
ST280S06P..	600													

Notes: See notes on page 86.

Thyristors

Phase Control Type

470-550 Amps RMS

International
IOR Rectifier

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} @ T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	dv/dt (4) (V/μs)	R _{thJC} DC (°C/W)	Case Outline Number (9)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
ST300S02P..	200	470	300	75	6730	7040	3.0	200	1.65	400	0.10	T12 A	(5)	TO-209AE (TO-118)
ST300S04P..	400													
ST300S06P..	600													
ST300S08P..	800													
ST300S10P..	1000													
ST300S12P..	1200													
ST300S14P..	1400													
ST300S16P..	1600													
ST300S18P..	1800													
ST300S20P..	2000													
ST330S02P..	200	520	330	75	7570	7920	3.0	200	1.50	400	0.10	T12 A	(5)	TO-209AE (TO-118)
ST330S04P..	400													
ST330S06P..	600													
ST330S08P..	800													
ST330S10P..	1000													
ST330S12P..	1200													
ST330S14P..	1400													
ST330S16P..	1600													
ST330S18P..	1800													
S30DG2A0	200	550	325	85	13350	14000	2.5	150	1.13	500	0.115	T11	(6)	
S30DG2B0	200													
S30DG4A0	400													
S30DG4B0	400													
S30DG6A0	600													
S30DG6B0	600													
S30DG8A0	800													
S30DG8B0	800													
S30D10A0	1000													
S30D10B0	1000													
S30D12A0	1200													
S30D12B0	1200													
S30D14A0	1400													
S30D14B0	1400													
S30D16A0	1600													
S30D16B0	1600													
S30D18A0	1800													
S30D20A0	2000													
S34DG2A0	200	550	350	92	15300	16000	2.5	150	1.08	500	0.095	T11	(6)	
S34DG2B0	200													
S34DG4A0	400													
S34DG4B0	400													
S34DG6A0	600													
S34DG6B0	600													
S34DG8A0	800													
S34DG8B0	800													
S34D10A0	1000													
S34D10B0	1000													
S34D12A0	1200													
S34D12B0	1200													
S34D14A0	1400													
S34D14B0	1400													
S34D16A0	1600													
S34D16B0	1600													
S34D18A0	1800													
S34D20A0	2000													



(1) 100% V_{RRM} reapplied @ T_j = T_j max. 125°C.

(2) T_j = 25°C.

(3) π x I_{T(AV)} @ T_J = 25°C.

(4) Linear to 0.8 V_{DRM}; T_J = 125°C.


(5) Available with metric stud; change "P" to "M" at end of part number: ST300S10M.

(6) Max. T_j = 125°C for standard types: High temperature types available with max. T_j = 150°C for V_{RRM} ≤ 1200V. Insert "H" before voltage code: S23DGH2A0.

(7) Available with flat base: to specify add "F" to the end of part number: S23D20A0F.

(8) Max. T_j = 125°C.

(9) For case outline drawing see page 173.

Part Number	VRRM VDRM (V)	IT(RMS) (A)	IT(AV) @ TC		ITSM (1)		VGT (2) (V)	IGT (2) (mA)	VTM (3) (V)	dv/dt (4) (V/μs)	RthJC DC (5) (°C/W)	Case Outline Number (8)	Notes	Case Style	
			(A)	(°C)	50 Hz (A)	60 Hz (A)									
ST110C02C ST110C04C ST110C06C ST110C08C ST110C10C ST110C12C ST110C14C ST110C16C	200 400 600 800 1000 1200 1400 1600	500	255	55	2270	2380	3.0	150	2.20	400	0.11	T13 A	(10)	TO-200AB (A-PUK)	
ST180C02C ST180C04C ST180C06C ST180C08C ST180C10C ST180C12C ST180C14C ST180C16C ST180C18C ST180C20C	200 400 600 800 1000 1200 1400 1600 1800 2000	660	350	55	4200	4400	3.0	150	2.10	400	0.08				
ST230C02C ST230C04C ST230C06C ST230C08C ST230C10C ST230C12C ST230C14C ST230C16C	200 400 600 800 1000 1200 1400 1600	780	410	55	4800	5000	3.0	150	1.90	400	0.08				
S23A2A S23A2B S23A4A S23A4B S23A6A S23A6B S23A8A S23A8B S23A10A S23A10B S23A12A S23A12B S23A14A S23A14B S23A16A S23A16B S23A18A S23A20A	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600 1800 2000	660 590 660 590 590 540 590 540 540 510 540 510 510 470 510 470 470	420 375 420 375 375 345 375 345 345 325 345 325 325 300 325 300 300		6600 6100 6600 6100 6100 5350 6100 5350 5350 4950 5350 4950 4950 4600 4950 4600 4600	6900 6400 6900 6400 6400 5600 6400 5600 5200 5600 5200 5200 4800 5200 4800 4800			1.40 1.53 1.40 1.53 1.53 1.64 1.53 1.64 1.64 1.73 1.64 1.73 1.73 1.84 1.73 1.84 1.84		500	0.085	T13 B	(6)	
				70			2.5	150		500	0.085		(8)		
													(6)		
													(8)		
ST280C02C ST280C04C ST280C06C	200 400 600	960	500	55	6600	6900	3.0	150	1.36	400	0.08	T13 A	(10) (11)		
ST280CH02C ST280CH04C ST280CH06C	200 400 600	1130	500	110	6000	6300	3	150	1.30	400	0.08		(10)		

- (1) 100% V_{RRM} reapplied @ t_j = T_j max. 125°C.
 (2) T_j = 25°C.
 (3) π x I_{T(AV)} @ T_J = 25°C.
 (4) Linear to 0.8 V_{DRM}; T_J = 125°C.
 (5) Double side cooled.

- (6) Max. T_j = 125°C for standard types: High temperature types available with max. T_j = 150°C for V_{RRM} ≤ 1200V.
 To specify insert "H" before voltage code: S30DGH2A0.
 (7) Available with flat base: to specify add "F" to the end of part number: S30D20A0F.
 (8) Max. T_j = 125°C.


- (9) For case outline drawing see page 173.
 (10) R_{thJ}-HS DC operation double side cooled
 (11) Max. T_j = 150°C

Thyristors


Phase Control Type

975-2220 Amps RMS

International
IOR Rectifier

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} @ T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	dv/dt (4) (V/μs)	R _{thJC} DC (5) (°C/W)	Case Outline Number (8)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
ST330C02L ST330C04L ST330C06L ST330C08L ST330C10L ST330C12L ST330C14L ST330C16L	200 400 600 800 1000 1200 1400 1600	1230	650	55	7570	7925	3	200	1.9	400	0.05	T14	(10)	TO-200AB (E-PUK)
ST300C02C ST300C04C ST300C06C ST300C08C ST300C10C ST300C12C ST300C14C ST300C16C ST300C18C ST300C20C	200 400 600 800 1000 1200 1400 1600 1800 2000	1290	650	55	6300	7040	3.0	200	2.25	400	0.04	T14 A		
ST330C02C ST330C04C ST330C06C ST330C08C ST330C10C ST330C12C ST330C14C ST330C16C	200 400 600 800 1000 1200 1400 1600	1420	720	55	7570	7925	3.0	200	2.00	400	0.04			
S30E2A S30E2B S30E4A S30E4B S30E6A S30E6B S30E8A S30E8B S30E10A S30E10B S30E12A S30E12B S30E14A S30E14B S30E16A S30E16B S30E18A S30E20A	200 200 400 400 600 600 800 800 1000 1000 1200 1200 1400 1400 1600 1600 1800 2000	1360 1220 1360 1220 1220 1115 1220 1115 1115 1050 1115 1050 1050 975 1050 975 975 975	865 775 865 775 775 710 775 710 710 665 710 665 665 620 665 620 620 620	70	13350 11950 13350 11950 11950 11000 11950 11000 11000 10050 11000 10050 10050 9050 10050 9050 9050 9050	14000 12500 14000 12500 12500 11500 12500 11500 11500 10500 11500 10500 10500 9500 10500 9500 9500 9500	2.5	150	1.41 1.53 1.41 1.53 1.53 1.64 1.53 1.64 1.64 1.73 1.64 1.73 1.73 1.84 1.73 1.84 1.84 1.84	500	0.040	T14 B	(6)	
													(7)	
													(6)	
													(7)	
ST380C02C ST380C04C ST380C06C	200 400 600	1900	960	55	12600	13200	3	200	1.6	400	0.04	T14 A	(10)	
ST380CH02C ST380CH04C ST380CH06C	200 400 600	2220	960	55	10500	11000	3	200	1.6	400	0.04		(11)(10)	

- (1) 100% V_{RRM} reapplied T_j = 125°C. (6) Max. T_j = 125°C for standard types: High temperature types available with max. T_j = 150°C for V_{RRM} ≤ 1200V. (8) For case outline drawing see page 173.
 (2) T_j = 25°C. (7) Max. T_j = 125°C. (10) R_{thJ-HS} DC operation double side cooled.
 (3) $\pi \times I_T(AV) @ T_J = 25^\circ C$. Insert "H" before voltage code: S23AH2A. (11) Max. T_j = 150°C.
 (4) Linear to 0.8 V_{DRM}; T_J = 125°C.
 (5) Double side cooled.

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} (A)	I _{T(AV)} @ T _C		I _{TSM} (1)		V _{GT} (2) (V)	I _{GT} (2) (mA)	V _{TM} (3) (V)	dv/dt (4) (V/μs)	R _{thJC} DC (5) (°C/W)	Case Outline Number (8)	Notes	Case Style
			(A)	(°C)	50 Hz (A)	60 Hz (A)								
S34B2A	200	1330	845		15330	16000			1.29			T15	(6)	TO-200AC
S34B2B	200	1195	760		14350	15000			1.38					
S34B4A	400	1330	845		15330	16000			1.29					
S34B4B	400	1195	760		14350	15000			1.38					
S34B6A	600	1195	760		14350	15000			1.38					
S34B6B	600	1115	710		13350	14000			1.46					
S34B8A	800	1195	760		14350	15000			1.38					
S34B8B	800	1115	710		13350	14000			1.46					
S34B10A	1000	1115	710	70	13350	14000	2.5	150	1.46	500	0.05			
S34B10B	1000	1050	670		12400	13000			1.54				(7)	
S34B12A	1200	1115	710		13350	14000			1.46				(6)	
S34B12B	1200	1050	670		12400	13000			1.54				(7)	
S34B14A	1400	1050	670		12400	13000			1.54					
S34B14B	1400	985	625		11000	11500			1.64					
S34B16A	1600	1050	670		12400	13000			1.54					
S34B16B	1600	985	625		11000	11500			1.64					
S34B18A	1800	985	625		11000	11500			1.64					
S34B20A	2000	985	625		11000	11500			1.64					
S38B2A	200	1820	1160		20550	21500			1.30				(6)	
S38B2B	200	1650	1050		19100	20000			1.40					
S38B4A	400	1820	1160		20550	21500			1.30					
S38B4B	400	1650	1050		19100	20000			1.40					
S38B6A	600	1650	1050		19100	20000			1.40					
S38B6B	600	1525	970		17650	18500			1.49					
S38B8A	800	1650	1050		19100	20000			1.40					
S38B8B	800	1525	970		17650	18500			1.49					
S38B10A	1000	1525	970	70	17650	18500	2.5	150	1.49	500	0.035			
S38B10B	1000	1430	910		16250	17000			1.59				(7)	
S38B12A	1200	1525	970		17650	18500			1.49				(6)	
S38B12B	1200	1430	910		16250	17000			1.59				(7)	
S38B14A	1400	1430	910		16250	17000			1.59					
S38B14B	1400	1350	855		14800	15500			1.67					
S38B16A	1600	1430	910		16250	17000			1.59					
S38B16B	1600	1350	855		14800	15500			1.67					
S38B18A	1800	1350	855		14800	15500			1.67					
S38B20A	2000	1350	855		14800	15500			1.67					
S52K2A	200	3000	1900		35700	37400			1.27			T16	(7)	A-24
S52K2B	200	2700	1720		32500	34000			1.35					
S52K4A	400	3000	1900		35700	37400			1.27					
S52K4B	400	2700	1720		32500	34000			1.35					
S52K6A	600	2700	1720		32500	34000			1.35					
S52K6B	600	2510	1600		30500	32000			1.44					
S52K8A	800	2700	1720		32500	34000			1.35					
S52K8B	800	2510	1600		30500	32000			1.44					
S52K10A	1000	2510	1600	70	30500	32000	2.5	200	1.44	500	0.023			
S52K10B	1000	2340	1490		28000	29500			1.53					
S52K12A	1200	2510	1600		30500	32000			1.44					
S52K12B	1200	2340	1490		28000	29500			1.53					
S52K14A	1400	2340	1490		28000	29500			1.53					
S52K14B	1400	2200	1400		25500	26900			1.60					
S52K16A	1600	2340	1490		28000	29500			1.53					
S52K16B	1600	2200	1400		25500	26900			1.60					
S52K18A	1800	2200	1400		25500	26900			1.60					
S52K20A	2000	2200	1400		25500	26900			1.60					
S77R10A	1000	5450	3470		63500	66500			1.39			T17		A-36
S77R10B	1000	5100	3250		58500	61750			1.47					
S77R12A	1200	5450	3470		63500	66500			1.39					
S77R12B	1200	5100	3250		58500	61750			1.47					
S77R14A	1400	5100	3250	70	58500	61750	2.5	250	1.47	500	0.011			
S77R14B	1400	4800	3060		53500	56000			1.54					
S77R16A	1600	5100	3250		58500	61750			1.47					
S77R16B	1600	4800	3060		53500	56000			1.54					
S77R18A	1800	4800	3060		53500	56000			1.54					
S77R20A	2000	4800	3060		53500	56000			1.54					

(1) 100% V_{RRM} reapplied T_J = 125°C.

(2) T_J = 25°C.

(3) π × I_{T(AV)} @ T_J = 25°C.

(4) Linear to 0.8 V_{DRM}; T_J = 125°C.

(5) Double side cooled

(6) Max. T_J = 125°C for standard types; High temperature types available with max. T_J = 150°C for V_{RRM} ≤ 1200V.

To specify insert "H" before voltage code: S34BH2A.

(7) Max. T_J = 125°C.



(8) For case outline drawing see page 173.

Thyristors

Triacs

25-50 Amps

International
IOR Rectifier

Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} @ T _C		I _{TSM} (1)		V _{TM} @ I _{TM} T _J = 25°C		R _{thJC} DC (°C/W)	Case Outline Number (5)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)	(V)	(A)				
25AC10A 25AC20A 25AC40A 25AC60A 25AC80A 25AC100A 25AC120A	100 200 400 600 800 1000 1200	25	82	200	209	1.9	35	1.15	T1	(2)	TO-208AA (TO-48) 
50AC10A 50AC20A 50AC40A 50AC60A 50AC80A 50AC100A 50AC120A	100 200 400 600 800 1000 1200	50	85	520	550	2.0	70	0.45	T3	(3)	TO-208AC (TO-65) 

(1) 100% V_{RRM} reapplied T_J = 125°C.

(2) Leaded version available, outline T2.

(3) Leaded version available, outline T4.

(5) For case outline drawing see page 173.

Thyristor Die Characteristics

Center Gate Thyristors⁽⁶⁾

Die Part No.	Dimensions Square Inches	Passivation	Current (I _{T(RMS)}) (A) (8)	Voltage Range (V)	Equiv. Device Series
IR210SG-G (7)	0.210	GLASS	35	100-1600	P100, P400 10, 16, 22, 25RIA B25RIA, B25H2S, B25DS/CS/JS, B40A
IR350SG-G (7)	0.350	GLASS	80	100-1600	50RIA, T50RIA, T70RIA IRKT/H/L41-56

Corner Gate Thyristors⁽⁶⁾

IR230SG-G (7)	0.230	GLASS	35	100-1200	IRKT/H/L26
IR480SG-G (7)	0.480	GLASS	140	100-1600	IRKT/H/L71-91, T90RIA

TRIAC⁽⁶⁾

IR210TG-G	0.210	GLASS	25	400-1200	25AC, B25AC
IR350TG-G	0.350	GLASS	50	400-1200	50AC, T50AC

To specify voltage, add suffix to die part number as follows:

SUFFIX	10	20	40	60	80	100	120	140	160
V _{DRM} /V _{RRM}	100	200	400	600	800	1000	1200	1400	1600

(6) For die outline drawing see page.

(7) Types listed have standard gold metallization on both sides (suffix G). Available with aluminum metallization on cathode side. To specify change suffix "G" to "A" (e.g. IR350SG-A).

(8) Values strongly dependent on assembly details.

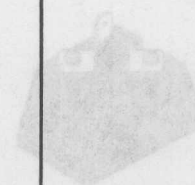
Power Modules

Fast Recovery

- The active components of the devices are protected by a layer of passivant compatible silicon rubber before filling the plastic case by a hard moisture resistant epoxy sealant. The epoxy also holds firmly the power and control leads which can be fastened to screw terminals and pins.
- Second generation Add-A-Pak modules use DBC (Direct Bonded Copper) technology.
- When more functions are used to perform complete functions, the internal interconnections are done by copper applications, by a petroleum oxide substrate.
- The junctions are isolated from the base plate by epoxy layer or alumina substrate or, in the case of soldered or pressed to a copper plate that can be screwed down to a heat dissipator.
- The junctions are mounted on an electrically isolating, thermally conductive substrate which is soldered or pressed to a copper plate that can be screwed down to a heat dissipator.



single phase or three phase molded blades.



7" Module - single
rectifier thyristor or
three in isolated
package



ADD-A-SALT - Potassium
and/or Thyristors for doublet
common anode, or common
cathode configurations.

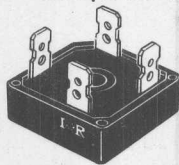
Details on Power Modules

**International
IOR Rectifier**

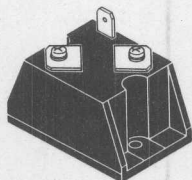
Power modules have established themselves as reliable packaging concepts on a par with traditional ceramic/metal forms of encapsulation in industrial applications with severe environmental constraints.

FEATURES

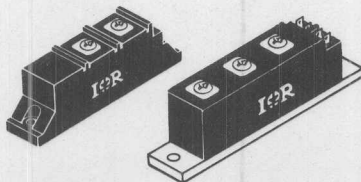
- The module technology has been developed to mount down square or round junctions, with center gate geometry for thyristors and triacs, with soldering or compression bonding technique.
- The junctions are mounted on an electrically isolating, thermally conductive substrate which is soldered or pressed to a copper plate that can be screwed down to a heat dissipator.
- The junctions are isolated from the base plate by epoxy layer or alumina substrate or, in the case of high power applications, by a beryllium oxide substrate. When more junctions are used to perform complete functions, the internal interconnections are done by copper connectors.
- Second generation Add-A-Pak modules use DBC (Direct Bonded Copper) technology.
- The active components of the devices are protected by a layer of passivant compatible silicon rubber before filling the plastic case by a hard moisture resistant epoxy sealant. The epoxy also holds firmly the power and control leads which can be fast-on or screw terminals and lugs.



JB-MB-MT Series – single phase or three phase molded diode bridges.

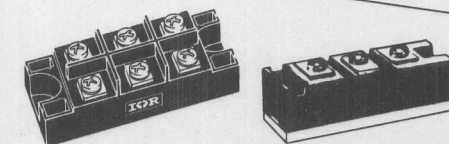
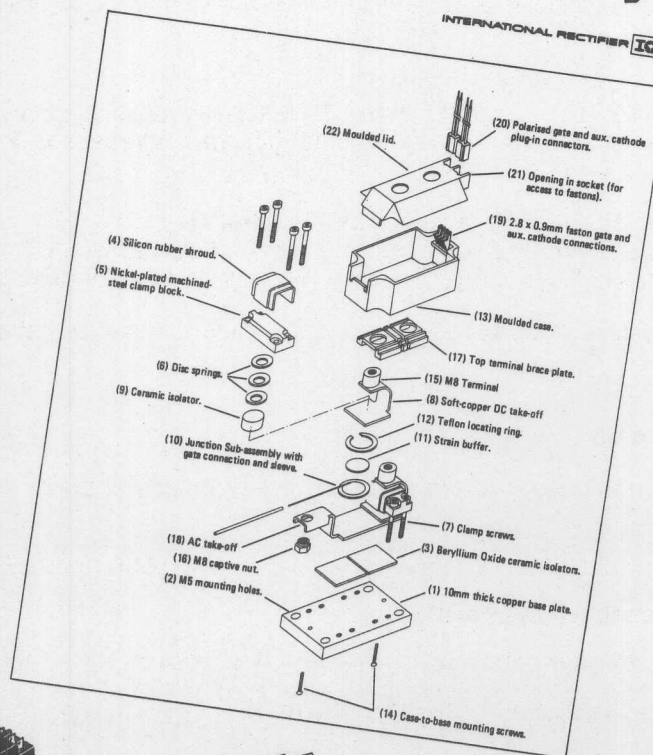


"T" Module – single rectifier, thyristor or triac in isolated package.

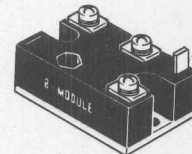


ADD-A-paks – Rectifiers and/or Thyristors in doubler, common anode, or common cathode configurations.

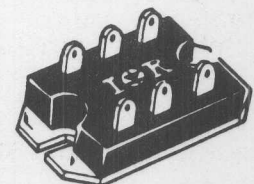
**MAGN-A-pak
POWER MODULES**



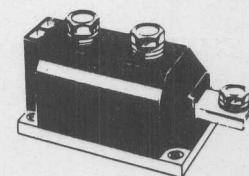
INT-A-paks – Rectifiers and/or Thyristors in doubler, common anode, or common cathode configurations and three phases bridge.



"B" Module – Rectifiers and/or Thyristors and/or Triacs in single, splitted, doubler, common anode or common cathode configurations.



PACE/paks – half-controlled and fully-controlled bridges, ac switch and doubler configurations.



MAGN-A-paks – Rectifiers and/or Thyristors in doubler, common anode, or common cathode configurations.

A rigorous Quality Control procedure and Quality Assurance program is supplemented by continuous reliability tests, with the recorded results ensuring lot traceability.

Quality Assurance Program Conformance Tests

Final tests are performed on line. Device characteristics are compared to the specified limits.

Furthermore, the use of statistical sampling by variables (xR charts) helps the continuous surveillance of the process capability.

The total elimination of any manufacturing defect is the foundation of International Rectifier's quality philosophy. The Average Outgoing Quality Level (AOQL) of the power modules is actually less than 500 ppm.

R.C.P. (Reliability Certification Program)

In addition to the conformance tests, a reliability program continually monitors the performance of production lots when subjected to accelerated life stressed as follows:

- **High temperature storage** (TJ max/24-168-500-1000 hrs)
Devices are placed in a fan oven, without reverse bias, at maximum rated junction temperature. Increases in forward voltage drop and reverse leakage will indicate defects.
- **High temperature reverse blocking life test** (VDRM, VRRM/TJ max/24-168-500-1000 hrs)
Devices are reverse biased at rated voltage and elevated temperature. This will detect any ionic contamination as well as surface or bulk defects which are monitored as reverse breakdown voltage and leakage current.
- **Temperature cycling** (5 cycles/-55°C to +150°C)
Devices are cycled from -55°C to +150°C with a 30 minute dwell time at each extreme. This test thermally stresses solders and internal connections. Increases in forward voltage drop and reverse leakage current will indicate defects.
- **Moisture resistance test** (85°C/85% R.H. 500 hrs minimum)
Devices are placed in a climatic chamber and their ambient raised to 85°C, 85% R.H. This test accelerates moisture penetration into the package to identify defects which cause blocking instability and corrosion. Defects are identified by abnormal leakage current, blocking voltage, on-state voltage and appearance.

Recommendations and Standards

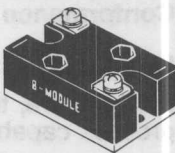
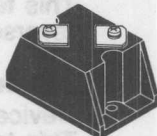

The design of the power module is based on the requirements of industrial power control and the standards governing this industry.

- UL recognized for Industrial Control Equipment according to UL508 (file N:E78996)
- UL94 (flammability of constituent materials).
- VDE0160 Recommendations for Line Operated Power Equipment
- VDE0110 Strike & Creep Distances in Electrical Equipment
- VDE0558 Power Conversion Equipment
- MIL-STD202E (Method 103B, level C steady state damp heat).
- MIL-STD883 Moisture resistance.

Power Modules

Diode, Fast

International Rectifier

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (8)		(3) V _{FM} (V)	R _{thJC} DC (1) (K/W)	t _{rr} (ns)	Case Outline Number (9)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
B40HFL10S02 B40HFL20S02 B40HFL40S02 B40HFL60S02	100 200 400 600	40	50	400	420	1.55	1.20	200 (70)	M2(A)	(2) (4) (6)	
B40HFL10S05 B40HFL20S05 B40HFL40S05 B40HFL60S05 B40HFL80S05 B40HFL100S05	100 200 400 600 800 1000	40	50	400	420	1.55	1.20	500 (110)			
B40HFL10S10 B40HFL20S10 B40HFL40S10 B40HFL60S10 B40HFL80S10 B40HFL100S10	100 200 400 600 800 1000	40	50	400	420	1.55	1.20	1000 (270)			
T40HFL10S02 T40HFL20S02 T40HFL40S02 T40HFL60S02	100 200 400 600	40	70	400	420	1.60	0.85	200 (70)	M3	(2) (4) (7)	
T40HFL10S05 T40HFL20S05 T40HFL40S05 T40HFL60S05 T40HFL80S05 T40HFL100S05	100 200 400 600 800 1000	40	70	400	420	1.60	0.85	500 (110)			
T40HFL10S10 T40HFL20S10 T40HFL40S10 T40HFL60S10 T40HFL80S10 T40HFL100S10	100 200 400 600 800 1000	40	70	400	420	1.60	0.85	1000 (270)			
T70HFL10S02 T70HFL20S02 T70HFL40S02 T70HFL60S02	100 200 400 600	70	70	700	730	1.73	0.53	200 (70)			
T70HFL10S05 T70HFL20S05 T70HFL40S05 T70HFL60S05 T70HFL80S05 T70HFL100S05	100 200 400 600 800 1000	70	70	700	730	1.73	0.53	500 (110)			
T70HFL10S10 T70HFL20S10 T70HFL40S10 T70HFL60S10 T70HFL80S10 T70HFL100S10	100 200 400 600 800 1000	70	70	700	730	1.73	0.53	1000 (270)			
T85HFL10S02 T85HFL20S02 T85HFL40S02 T85HFL60S02	100 200 400 600	85	70	1100	1150	1.55	0.46	200 (80)			
T85HFL10S05 T85HFL20S05 T85HFL40S05 T85HFL60S05 T85HFL80S05 T85HFL100S05	100 200 400 600 800 1000	85	70	1100	1150	1.55	0.46	500 (120)			
T85HFL10S10 T85HFL20S10 T85HFL40S10 T85HFL60S10 T85HFL80S10 T85HFL100S10	100 200 400 600 800 1000	85	70	1100	1150	1.55	0.46	1000 (290)			

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50Hz.

(3) V_{FM} at I_{FM} = $\pi \times I_{F(AV)}$, T_J = 25°C.

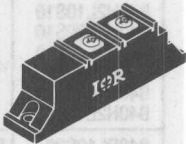
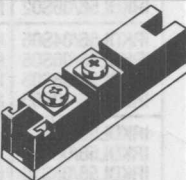
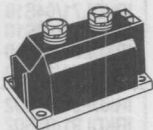
(4) t_{rr} conditions: T_J = 25°C, I_F = 1A to V_R = 30V -diF/dt = 100A/μs
values shown in parenthesis

(6) t_{rr} conditions: T_J = 25°C, I_F = 125A, V_R = 30V -diF/dt = 25A/μs.

(7) t_{rr} conditions: T_J = 25°C, I_{FM} = $\pi \times$ rated I_{F(AV)}, -diF/dt = 25A/μs.

(8) 100% V_{RRM} reapplied. T_J = T_J max.

(9) For case outline drawing see page 176, 178.

Part Number	V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (8)		(3) V _{FM} (V)	R _{thJC} DC (1) (K/W)	t _{rr} (ns)	Case Outline Number (9)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)						
IRKEL56/04S02 IRKEL56/06S02	400 600	55	70	800	840	1.72	0.60	200 (70)	M4A	(2) (4) (7) (10)	 PENDING UL RECOGNITION
IRKEL56/04S05 IRKEL56/06S05 IRKEL56/08S05 IRKEL56/10S05	400 600 800 1000	55	70	800	840	1.72	0.60	500 (110)			
IRKEL56/04S10 IRKEL56/06S10 IRKEL56/08S10 IRKEL56/10S10	400 600 800 1000	55	70	800	840	1.72	0.60	1000 (270)			
IRKEL71/04S02 IRKEL71/06S02	400 600	70	75	850	890	1.36	0.53	200 (70)			
IRKEL71/04S05 IRKEL71/06S05 IRKEL71/08S05 IRKEL71/10S05	400 600 800 1000	70	75	850	890	1.36	0.53	500 (110)			
IRKEL71/04S10 IRKEL71/06S10 IRKEL71/08S10 IRKEL71/10S10	400 600 800 1000	70	75	850	890	1.36	0.53	1000 (270)			
IRKEL91/04S02 IRKEL91/06S02	400 600	90	75	1200	1256	1.45	0.38	200 (80)	M5	(5) (6) (11)	 U.L. RECOGNIZED File no: E78996
IRKEL91/04S05 IRKEL91/06S05 IRKEL91/08S05 IRKEL91/10S05	400 600 800 1000	90	75	1200	1256	1.45	0.38	500 (120)			
IRKEL91/04S10 IRKEL91/06S10 IRKEL91/08S10 IRKEL91/10S10	400 600 800 1000	90	75	1200	1256	1.45	0.38	1000 (290)			
IRKEL132-04S10 IRKEL132-06S10 IRKEL132-08S10 IRKEL132-10S10	400 600 800 1000	140	100	2500	2600	1.68	0.20	1000			
IRKEL132-04S20 IRKEL132-06S20 IRKEL132-08S20 IRKEL132-10S20 IRKEL132-12S20 IRKEL132-14S20	400 600 800 1000 1200 1400	140	100	2500	2600	1.68	0.20	2000			
IRKEL240-04S10 IRKEL240-06S10 IRKEL240-08S10 IRKEL240-10S10	400 600 800 1000	250	100	6750	7100	1.57	0.125	1000	M6	(5) (6)	 U.L. RECOGNIZED File no: E78996
IRKEL240-04S20 IRKEL240-06S20 IRKEL240-08S20 IRKEL240-10S20 IRKEL240-12S20 IRKEL240-14S20	400 600 800 1000 1200 1400	250	100	6750	7100	1.57	0.125	2000			
IRKEL240-16S30 IRKEL240-18S30 IRKEL240-20S30 IRKEL240-22S30 IRKEL240-24S30 IRKEL240-25S30	1600 1800 2000 2200 2400 2500	240	100	6300	6600	1.75	0.125	3000			

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50Hz.

(3) V_{FM} at I_{FM} = $\pi \times I_F(AV)$, T_j = 25°C

(4) t_{rr} conditions: T_j = 25°C, I_F = 1A to V_R = 30V -di_F/dt = 100A/ μ s values shown in parenthesis.

(5) RMS isolation voltage: 3000V-50Hz.

(6) t_{rr} conditions: I_{FM} = 500A, di/dt = 100A/ μ s, T_j = 150°C, V_R = 50V.

(7) t_{rr} conditions: T_j = 25°C, I_{FM} = $\pi \times$ rated I_F(AV), -di_F/dt = 25A/ μ s.

(8) 100% V_{RRM} reapplied. T_j = T_j max. = 125°C.

(9) For case outline drawing see page 178.

(10) New generation of ADD-A-Pak modules are identified by a "/" (slash) in the part number instead of the "-" of the old part number.

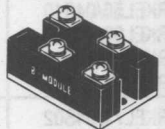
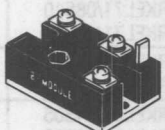
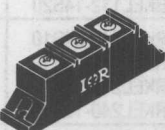
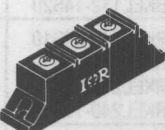
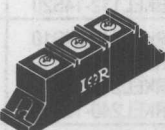
(11) All devices can be supplied with non toxic materials.


Add suffix "N" to part number.

Power Modules

Diode/Diode, Fast

International
Rectifier

Part Number			V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (9)		(8)	R _{thJC} DC	t _{rr} (ns)	Case Outline Number (10)	Notes	Case Style	
(3)	(4)	(5)		(A)	(°C)	50 Hz (A)	60 Hz (A)	V _{FM} (V)	(1) (K/W)					
B40H2L10S02 B40H2L20S02 B40H2L40S02 B40H2L60S02	—	—	100 200 400 600	40	50	400	420	1.55	0.60	200 (70)	M2(B)	(2) (6) (7) (11)		
B40H2L10S05 B40H2L20S05 B40H2L40S05 B40H2L60S05 B40H2L80S05 B40H2L100S05	—	—	100 200 400 600 800 1000	40	50	400	420	1.55	0.60	500 (110)				
B40H2L10S10 B40H2L20S10 B40H2L40S10 B40H2L60S10 B40H2L80S10 B40H2L100S10	—	—	100 200 400 600 800 1000	40	50	400	420	1.55	0.60	1000 (270)				
B40DL10S02 B40DL20S02 B40DL40S02 B40DL60S02	B40CL10S02 B40CL20S02 B40CL40S02 B40CL60S02	B40JL10S02 B40JL20S02 B40JL40S02 B40JL60S02	100 200 400 600	40	50	400	420	1.55	0.60	200 (70)	M2(E)	(2) (6) (7)		
B40DL10S05 B40DL20S05 B40DL40S05 B40DL60S05 B40DL80S05 B40DL100S05	B40CL10S05 B40CL20S05 B40CL40S05 B40CL60S05 B40CL80S05 B40CL100S05	B40JL10S05 B40JL20S05 B40JL40S05 B40JL60S05 B40JL80S05 B40JL100S05	100 200 400 600 800 1000	40	50	400	420	1.55	0.60	500 (110)				
B40DL10S10 B40DL20S10 B40DL40S10 B40DL60S10 B40DL80S10 B40DL100S10	B40CL10S10 B40CL20S10 B40CL40S10 B40CL60S10 B40CL80S10 B40CL100S10	B40JL10S10 B40JL20S10 B40JL40S10 B40JL60S10 B40JL80S10 B40JL100S10	100 200 400 600 800 1000	40	50	400	420	1.55	0.60	1000 (270)				
IRKDL56/04S02 IRKDL56/06S02	IRKCL56/04S02 IRKCL56/06S02	IRKJL56/04S02 IRKJL56/06S02	400 600	55	70	800	840	1.72	0.30	200 (70)	M4A	(2) (6) (7) (12) (15)		
IRKDL56/04S05 IRKDL56/06S05 IRKDL56/08S05 IRKDL56/10S05	IRKCL56/04S05 IRKCL56/06S05 IRKCL56/08S05 IRKCL56/10S05	IRKJL56/04S05 IRKJL56/06S05 IRKJL56/08S05 IRKJL56/10S05	400 600 800 1000	55	70	800	840	1.72	0.30	500 (110)				
IRKDL56/04S10 IRKDL56/06S10 IRKDL56/08S10 IRKDL56/10S10	IRKCL56/04S10 IRKCL56/06S10 IRKCL56/08S10 IRKCL56/10S10	IRKJL56/04S10 IRKJL56/06S10 IRKJL56/08S10 IRKJL56/10S10	400 600 800 1000	55	70	800	840	1.72	0.30	500 (270)				
IRKDL71/04S02 IRKDL71/06S02	IRKCL71/04S02 IRKCL71/06S02	IRKJL71/04S02 IRKJL71/06S02	400 600	70	75	850	890	1.36	0.265	200 (70)	M4A	(2) (6) (7) (12) (15)		
IRKDL71/04S05 IRKDL71/06S05 IRKDL71/08S05 IRKDL71/10S05	IRKCL71/04S05 IRKCL71/06S05 IRKCL71/08S05 IRKCL71/10S05	IRKJL71/04S05 IRKJL71/06S05 IRKJL71/08S05 IRKJL71/10S05	400 600 800 1000	70	75	850	890	1.36	0.265	500 (110)				
IRKDL71/04S10 IRKDL71/06S10 IRKDL71/08S10 IRKDL71/10S10	IRKCL71/04S10 IRKCL71/06S10 IRKCL71/08S10 IRKCL71/10S10	IRKJL71/04S10 IRKJL71/06S10 IRKJL71/08S10 IRKJL71/10S10	400 600 800 1000	70	75	850	890	1.36	0.265	1000 (270)				
IRKDL91/04S02 IRKDL91/06S02	IRKCL91/04S02 IRKCL91/06S02	IRKJL91/04S02 IRKJL91/06S02	400 600	90	75	1200	1256	1.45	0.19	200 (80)	M4A	(2) (6) (7) (12) (15)		
IRKDL91/04S05 IRKDL91/06S05 IRKDL91/08S05 IRKDL91/10S05	IRKCL91/04S05 IRKCL91/06S05 IRKCL91/08S05 IRKCL91/10S05	IRKJL91/04S05 IRKJL91/06S05 IRKJL91/08S05 IRKJL91/10S05	400 600 800 1000	90	75	1200	1256	1.45	0.19	500 (120)				
IRKDL91/04S10 IRKDL91/06S10 IRKDL91/08S10 IRKDL91/10S10	IRKCL91/04S10 IRKCL91/06S10 IRKCL91/08S10 IRKCL91/10S10	IRKJL91/04S10 IRKJL91/06S10 IRKJL91/08S10 IRKJL91/10S10	400 600 800 1000	90	75	1200	1256	1.45	0.19	1000 (290)				



U.L.
RECOGNIZED
File no: E78996

PENDING U.L.
RECOGNITION

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50Hz.

(3) Doubler circuit. All except for B40H2L series.

(4) Center tap, circuit common cathode. Contact factory.

(5) Center tap, circuit common anode. Contact Factory.

(6) t_{rr} conditions: T_j = 25°C, I_F = 125A, V_R = 30V -di_F/dt = 25A/μs.

(7) t_{rr} conditions: T_j = 25°C, I_F = 1A, V_R = 30V -di_F/dt = 100A/μs values shown in parenthesis.

(16) RMS isolation voltage: 3000V-50Hz.

(8) V_{FM} at I_{FM} = π × I_F(AV), T_j = 25°C.

(9) 100% V_{RRM} reapplied. T_j = T_j max. = 125°C.

(10) For case outline drawing see page 176, 178.

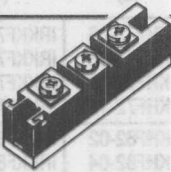
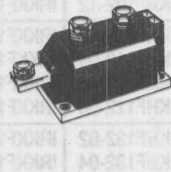

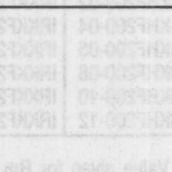
(11) Two independent diodes.

(12) New generation of ADD-A-Pak modules are identified by a "/" (slash) in the part number instead of the "-" of the old part number.

(13) All devices can be supplied with non toxic material. Add suffix N to part number.

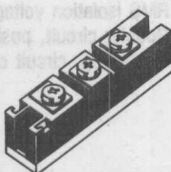

(14) t_{rr} conditions: I_F = 500A, -di_F/dt = 100A/M1, T_j = 150°C, V_R = 50.

(15) t_{rr} conditions: T_j = 25°C, I_{FM} = π × rated I_F(AV), -di_F/dt = 25A/μs.

Part Number			V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (9)		(8) V _{FM} (V)	R _{thJC} DC (1) (K/W)	t _{rr} (ns)	Case Outline Number (10)	Notes	Case Style
(3)	(4)	(5)		(A)	(°C)	50 Hz (A)	60 Hz (A)						
IRKDL132-04S10	IRKCL132-04S10	IRKJL132-04S10	400	140	100	2500	2600	1.68	0.10	1000	M5	(13) (14) (16)	 U.L. RECOGNIZED File no: E78996
IRKDL132-06S10	IRKCL132-06S10	IRKJL132-06S10	600										
IRKDL132-08S10	IRKCL132-08S10	IRKJL132-08S10	800										
IRKDL132-10S10	IRKCL132-10S10	IRKJL132-10S10	1000										
IRKDL132-04S20	IRKCL132-04S20	IRKJL132-04S20	400	140	100	2500	2600	1.68	0.10	2000	M5		 U.L. RECOGNIZED File no: E78996
IRKDL132-06S20	IRKCL132-06S20	IRKJL132-06S20	600										
IRKDL132-08S20	IRKCL132-08S20	IRKJL132-08S20	800										
IRKDL132-10S20	IRKCL132-10S20	IRKJL132-10S20	1000										
IRKDL132-12S20	IRKCL132-12S20	IRKJL132-12S20	1200	250	100	6750	7100	1.57	0.063	1000	M6		 U.L. RECOGNIZED File no: E78996
IRKDL132-14S20	IRKCL132-14S20	IRKJL132-14S20	1400										
IRKDL240-04S10	IRKCL240-04S10	IRKJL240-04S10	400										
IRKDL240-06S10	IRKCL240-06S10	IRKJL240-06S10	600										
IRKDL240-08S10	IRKCL240-08S10	IRKJL240-08S10	800	250	100	6750	7100	1.57	0.063	2000	M6		 U.L. RECOGNIZED File no: E78996
IRKDL240-10S20	IRKCL240-10S20	IRKJL240-10S20	1000										
IRKDL240-12S20	IRKCL240-12S20	IRKJL240-12S20	1200										
IRKDL240-14S20	IRKCL240-14S20	IRKJL240-14S20	1400										
IRKDL240-16S30	IRKCL240-16S30	IRKJL240-16S30	1600	240	100	6300	1.75	0.063	3000				
IRKDL240-18S30	IRKCL240-18S30	IRKJL240-18S30	1800										
IRKDL240-20S30	IRKCL240-20S30	IRKJL240-20S30	2000										
IRKDL240-22S30	IRKCL240-22S30	IRKJL240-22S30	2200										
IRKDL240-24S30	IRKCL240-24S30	IRKJL240-24S30	2400	2500									
IRKDL240-25S30	IRKCL240-25S30	IRKJL240-25S30	2500										

For Notes see page 98.

Thyristor/Thyristor, Fast

Part Number			V _{RRM} V _{DRM} (V)	I _T (AV) @ T _C		I _{TSM} (6)		R _{thJC} DC (1) (K/W)	t _q Range (μs)	Case Outline Number (10)	Notes	Case Style
(3)	(4)	(5)		(A)	(°C)	50 Hz (A)	60 Hz (A)					
IRKTF72-06	IRKUF72-06	IRKVF72-06	600	71	90	1750	1830	0.125	18 to 25	M5	(2) (11)	 U.L. RECOGNIZED File no: E78996
IRKTF72-08	IRKUF72-08	IRKVF72-08	800									
IRKTF72-10	IRKUF72-10	IRKVF72-10	1000									
IRKTF72-12	IRKUF72-12	IRKVF72-12	1200									
IRKTF82-02	IRKUF82-02	IRKVF82-02	200	81	90	1850	1950	0.125	10 to 20	M5		
IRKTF82-04	IRKUF82-04	IRKVF82-04	400									
IRKTF82-06	IRKUF82-06	IRKVF82-06	600									
IRKTF82-08	IRKUF82-08	IRKVF82-08	800									
IRKTF102-06	IRKUF102-06	IRKVF102-06	600	105	90	2400	2500	0.085	18 to 25	M5		
IRKTF102-08	IRKUF102-08	IRKVF102-08	800									
IRKTF102-10	IRKUF102-10	IRKVF102-10	1000									
IRKTF102-12	IRKUF102-12	IRKVF102-12	1200									
IRKTF112-02	IRKUF112-02	IRKVF112-02	200	112	90	2600	2720	0.085	10 to 20	M5		
IRKTF112-04	IRKUF112-04	IRKVF112-04	400									
IRKTF112-06	IRKUF112-06	IRKVF112-06	600									
IRKTF112-08	IRKUF112-08	IRKVF112-08	800									
IRKTF132-02	IRKUF132-02	IRKVF132-02	200	130	90	2700	2825	0.085	12 to 18	M5		
IRKTF132-04	IRKUF132-04	IRKVF132-04	400									
IRKTF132-06	IRKUF132-06	IRKVF132-06	600									
IRKTF132-08	IRKUF132-08	IRKVF132-08	800									
IRKTF152-02	IRKUF152-02	IRKVF152-02	200	150	90	3700	3870	0.085	12 to 18	M5		
IRKTF152-04	IRKUF152-04	IRKVF152-04	400									
IRKTF152-06	IRKUF152-06	IRKVF152-06	600									
IRKTF152-08	IRKUF152-08	IRKVF152-08	800									
IRKTF180-02	IRKUF180-02	IRKVF180-02	200	180	85	6000	6280	0.063	18 to 25	M6		 U.L. RECOGNIZED File no: E78996
IRKTF180-04	IRKUF180-04	IRKVF180-04	400									
IRKTF180-06	IRKUF180-06	IRKVF180-06	600									
IRKTF180-08	IRKUF180-08	IRKVF180-08	800									
IRKTF180-10	IRKUF180-10	IRKVF180-10	1000	200	85	6400	6700	0.063	18 to 25			
IRKTF180-12	IRKUF180-12	IRKVF180-12	1200									
IRKTF200-02	IRKUF200-02	IRKVF200-02	200									
IRKTF200-04	IRKUF200-04	IRKVF200-04	400									
IRKTF200-06	IRKUF200-06	IRKVF200-06	600	200	85	6400	6700	0.063	18 to 25			
IRKTF200-08	IRKUF200-08	IRKVF200-08	800									
IRKTF200-10	IRKUF200-10	IRKVF200-10	1000									
IRKTF200-12	IRKUF200-12	IRKVF200-12	1200									

 (1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3000V-50 Hz.

(3) Doubler circuit.

(4) Center tap, circuit common cathode. Contact factory

(5) Center tap, circuit common anode. Contact factory.

 (6) 100% V_{RRM} reapplied. T_j = T_j max. = 125°C.

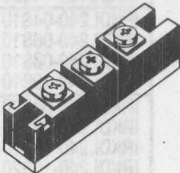
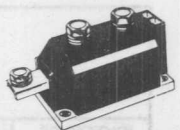
(10) For case outline drawing see page 178.


 (11) All devices can be supplied with non toxic materials.
Add suffix N to part number.


Power Modules

Thyristor/Diode, Fast

International
IOR Rectifier

Part Number				VRRM VDRM (V)	IT(AV) @ TC		I _{TSM} (7)		R _{thJC} DC (1) (K/W)	t _q Range (ns)	Case Outline Number (8)	Notes	Case Style			
(3)	(4)	(5)	(6)		(A)	(°C)	50 Hz (A)	60 Hz (A)								
IRKHF72-06	IRKKF72-06	IRKLF72-06	IRKNF72-06	600	71	90	1750	1830	0.125	18 to 25	M5	(2) (9)				
IRKHF72-08	IRKKF72-08	IRKLF72-08	IRKNF72-08	800												
IRKHF72-10	IRKKF72-10	IRKLF72-10	IRKNF72-10	1000												
IRKHF72-12	IRKKF72-12	IRKLF72-12	IRKNF72-12	1200												
IRKHF82-02	IRKKF82-02	IRKLF82-02	IRKNF82-02	200	81	90	1850	1950	0.125	10 to 20						
IRKHF82-04	IRKKF82-04	IRKLF82-04	IRKNF82-04	400												
IRKHF82-06	IRKKF82-06	IRKLF82-06	IRKNF82-06	600												
IRKHF82-08	IRKKF82-08	IRKLF82-08	IRKNF82-08	800												
IRKHF102-06	IRKKF102-06	IRKLF102-06	IRKNF102-06	600	105	90	2400	2500	0.085	18 to 25						
IRKHF102-08	IRKKF102-08	IRKLF102-08	IRKNF102-08	800												
IRKHF102-10	IRKKF102-10	IRKLF102-10	IRKNF102-10	1000												
IRKHF102-12	IRKKF102-12	IRKLF102-12	IRKNF102-12	1200												
IRKHF112-02	IRKKF112-02	IRKLF112-02	IRKNF112-02	200	112	90	2600	2700	0.085	10 to 20						
IRKHF112-04	IRKKF112-04	IRKLF112-04	IRKNF112-04	400												
IRKHF112-06	IRKKF112-06	IRKLF112-06	IRKNF112-06	600												
IRKHF112-08	IRKKF112-08	IRKLF112-08	IRKNF112-08	800												
IRKHF132-02	IRKKF132-02	IRKLF132-02	IRKNF132-02	200	130	90	2700	2825	0.085	12 to 18						
IRKHF132-04	IRKKF132-04	IRKLF132-04	IRKNF132-04	400												
IRKHF132-06	IRKKF132-06	IRKLF132-06	IRKNF132-06	600												
IRKHF132-08	IRKKF132-08	IRKLF132-08	IRKNF132-08	800												
IRKHF152-02	IRKKF152-02	IRKLF152-02	IRKNF152-02	200	150	90	3700	3870	0.085	12 to 18						
IRKHF152-04	IRKKF152-04	IRKLF152-04	IRKNF152-04	400												
IRKHF152-06	IRKKF152-06	IRKLF152-06	IRKNF152-06	600												
IRKHF152-08	IRKKF152-08	IRKLF152-08	IRKNF152-08	800												
IRKHF180-02	IRKKF180-02	IRKLF180-02	IRKNF180-02	200	180	85	6000	6280	0.063	18 to 25	M6					
IRKHF180-04	IRKKF180-04	IRKLF180-04	IRKNF180-04	400												
IRKHF180-06	IRKKF180-06	IRKLF180-06	IRKNF180-06	600												
IRKHF180-08	IRKKF180-08	IRKLF180-08	IRKNF180-08	800												
IRKHF180-10	IRKKF180-10	IRKLF180-10	IRKNF180-10	1000												
IRKHF180-12	IRKKF180-12	IRKLF180-12	IRKNF180-12	1200												
IRKHF200-02	IRKKF200-02	IRKLF200-02	IRKNF200-02	200	200	85	6400	6700	0.063	18 to 25						
IRKHF200-04	IRKKF200-04	IRKLF200-04	IRKNF200-04	400												
IRKHF200-06	IRKKF200-06	IRKLF200-06	IRKNF200-06	600												
IRKHF200-08	IRKKF200-08	IRKLF200-08	IRKNF200-08	800												
IRKHF200-10	IRKKF200-10	IRKLF200-10	IRKNF200-10	1000												
IRKHF200-12	IRKKF200-12	IRKLF200-12	IRKNF200-12	1200												

**U.L.**
RECOGNIZED
File no: E78996

**U.L.**
RECOGNIZED
File no: E78996

- (1) Value given for RthJC is per module.
 (2) RMS isolation voltage: 3000V-50 Hz.
 (3) Doubler circuit, positive control.
 (4) Center tap, circuit common cathode. Contact factory.

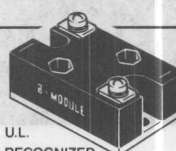
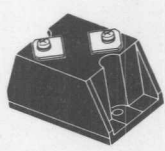
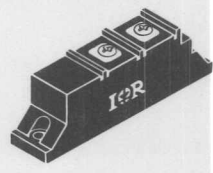
- (5) Doubler circuit, negative control.
 (6) Center tap, circuit common anode. Contact factory.
 (7) 100% VRRM reapplied. Tj = Tj max. = 125°C.
 (8) For case outline drawing see page 178.
 (9) All devices can be supplied with non toxic material.
 Add suffix N to part number.

Power Modules

Power Modules

Diode

International
IOR Rectifier

Part Number	V _{RRM} (V)	I _F (AV) @ T _C		I _{FSM} (5)		(3) V _{FM} (V)	R _{thJC} DC (1) (K/W)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
B40HF10 B40HF20 B40HF40 B40HF60 B40HF80 B40HF100 B40HF120	100 200 400 600 800 1000 1200	40	85	550	575	1.31	1.20	M2(A)	(2)	 U.L. RECOGNIZED File no: E78996
T40HF10 T40HF20 T40HF40 T40HF60 T40HF80 T40HF100 T40HF120 T40HF140 T40HF160	100 200 400 600 800 1000 1200 1400 1600	40	85	480	500	1.30	1.36	M3	(2)	 U.L. RECOGNIZED File no: E78996
T70HF10 T70HF20 T70HF40 T70HF60 T70HF80 T70HF100 T70HF120 T70HF140 T70HF160	100 200 400 600 800 1000 1200 1400 1600	70	85	1000	1050	1.35	0.69			
T85HF10 T85HF20 T85HF40 T85HF60 T85HF80 T85HF100 T85HF120 T85HF140 T85HF160	100 200 400 600 800 1000 1200 1400 1600	85	85	1450	1500	1.27	0.62			
T110HF10 T110HF20 T110HF40 T110HF60 T110HF80 T110HF100 T110HF120 T110HF140 T110HF160	100 200 400 600 800 1000 1200 1400 1600	110	85	1700	1780	1.35	0.47			
IRKE56/04 IRKE56/06 IRKE56/08 IRKE56/10 IRKE56/12	400 600 800 1000 1200	55	100	1350	1420	1.35	0.65	M4A	(2) (4) (7)	 PENDING U.L. RECOGNITION
IRKE61/14 IRKE61/16 IRKE61/18 IRKE61/20	1400 1600 1800 2000	60	90	1220	1270	1.35	0.65			
IRKE71/04 IRKE71/06 IRKE71/08 IRKE71/10 IRKE71/12	400 600 800 1000 1200	70	100	1500	1570	1.30	0.57			
IRKE81/14 IRKE81/16 IRKE81/18 IRKE81/20	1400 1600 1800 2000	80	88	1350	1410	1.36	0.50			

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50 Hz.

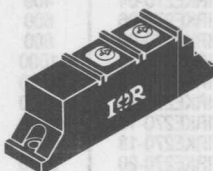
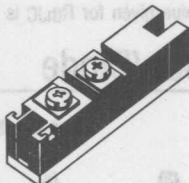
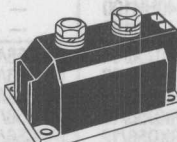
(3) V_{FM} at I_{FM} = I_F(AV) × π, T_j = 25°C.

(4) RMS isolation voltage: 3000V-50 Hz.

(5) 100% V_{RRM} reapplied. T_j = T_j max. = 150°C.

(6) For case outline drawing see page 176.

(7) New generation of ADD-A-Pak modules are identified by a "/" (slash) in the part number instead of the "-" of the old part number.

Part Number	VRRM (V)	IF(AV) @ TC		IFSM (5)		(3) VFM (V)	RthJC DC (1) (K/W)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
IRKE91/04 IRKE91/06 IRKE91/08 IRKE91/10 IRKE91/12	400 600 800 1000 1200	90	100	1700	1780	1.30	0.44	M4A	(2) (7)	 PENDING U.L. RECOGNITION
IRKE101/14 IRKE101/16 IRKE101/18 IRKE101/20	1400 1600 1800 2000									
IRKE165-04 IRKE165-06 IRKE165-08 IRKE165-10 IRKE165-12 IRKE165-14 IRKE165-16 IRKE165-18 IRKE165-20	400 600 800 1000 1200 1400 1600 1800 2000	165	100	3350	3500	1.57	0.20	M5	(4) (8)	
IRKE195-04 IRKE195-06 IRKE195-08 IRKE195-10 IRKE195-12 IRKE195-14 IRKE195-16 IRKE195-18 IRKE195-20	400 600 800 1000 1200 1400 1600 1800 2000									
IRKE235-04 IRKE235-06 IRKE235-08 IRKE235-10 IRKE235-12 IRKE235-14 IRKE235-16 IRKE235-18 IRKE235-20 IRKE235-22 IRKE235-24	400 600 800 1000 1200 1400 1600 1800 2000 2200 2400	195	100	4000	4200	1.32	0.20			 U.L. RECOGNIZED File no: E78996
IRKE250-04 IRKE250-06 IRKE250-08 IRKE250-10 IRKE250-12 IRKE250-14 IRKE250-16 IRKE250-18 IRKE250-20	400 600 800 1000 1200 1400 1600 1800 2000									
IRKE235-04 IRKE235-06 IRKE235-08 IRKE235-10 IRKE235-12 IRKE235-14 IRKE235-16 IRKE235-18 IRKE235-20 IRKE235-22 IRKE235-24	400 600 800 1000 1200 1400 1600 1800 2000 2200 2400	230	100	5500	5700	1.26	0.17			
IRKE250-04 IRKE250-06 IRKE250-08 IRKE250-10 IRKE250-12 IRKE250-14 IRKE250-16 IRKE250-18 IRKE250-20	400 600 800 1000 1200 1400 1600 1800 2000									
IRKE250-04 IRKE250-06 IRKE250-08 IRKE250-10 IRKE250-12 IRKE250-14 IRKE250-16 IRKE250-18 IRKE250-20	400 600 800 1000 1200 1400 1600 1800 2000	250	100	5900	6180	1.29	0.16	M6		 U.L. RECOGNIZED File no: E78996
IRKE250-04 IRKE250-06 IRKE250-08 IRKE250-10 IRKE250-12 IRKE250-14 IRKE250-16 IRKE250-18 IRKE250-20	400 600 800 1000 1200 1400 1600 1800 2000									

(1) Value given for RthJC is per module.

(2) RMS isolation voltage: 3500V-50 Hz.

(3) VFM at IFM = IF(AV) x π , Tj = 25°C.

(4) RMS isolation voltage: 3000V-50 Hz.

(5) 100% VRRM reapplied. Tj = Tj max. = 150°C.

(6) For case outline drawing see page 178.

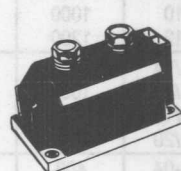

(7) New generation of ADD-A-Pak modules are identified by a "/" (slash) in the part number instead of the "-" of the old part number.

(8) All devices can be supplied with non toxic material. Add suffix N to part number.

Power Modules

Diode

International
Rectifier

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (5)		(3) V _{FM} (V)	R _{thJC} DC (1) (K/W)	Case Outline Number (6)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
IRKE270-04 IRKE270-06 IRKE270-08 IRKE270-10 IRKE270-12 IRKE270-14 IRKE270-16 IRKE270-18 IRKE270-20 IRKE270-22 IRKE270-24 IRKE270-26 IRKE270-28 IRKE270-30	400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2400 2600 3000	270	100	7500	7850	1.48	0.125	M6	(4)	
IRKE320-04	400									
IRKE320-06	600									
IRKE320-08	800									
IRKE320-10	1000									
IRKE320-12	1200									
IRKE320-14	1400									
IRKE320-16	1600									
IRKE320-18	1800									
IRKE320-20	2000									
IRKE320-22	2200									
IRKE320-24	2400									
IRKE320-26	2400									
IRKE320-28	2600									
IRKE320-30	3000									
IRKE320-04 IRKE320-06 IRKE320-08 IRKE320-10 IRKE320-12 IRKE320-14 IRKE320-16 IRKE320-18 IRKE320-20	400 600 800 1000 1200 1400 1600 1800 2000	320	100	8500	8900	1.28	0.125			
IRKE320-22	2200									
IRKE320-24	2400									
IRKE320-26	2400									
IRKE320-28	2600									
IRKE320-30	3000									
IRKE320-32	3200									
IRKE320-34	3400									
IRKE320-36	3600									

(1) Value given for R_{thJC} is per module.

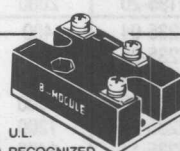
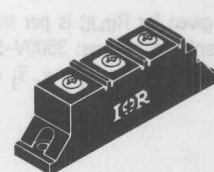
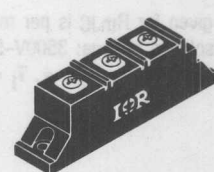
(3) V_{FM} at I_{FM} = I_{F(AV)} × π, T_j = 25°C.

(5) 100% V_{RRM} reapplied. T_j = T_j max. = 150°C.

(4) RMS isolation voltage: 3000V-50 Hz.

(6) For case outline drawing see page 178.

Diode/Diode

Part Number			V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (7)		(9) V _{FM} (V)	R _{thJC} DC (1) (K/W)	Case Outline Number (8)	Notes	Case Style
(3)	(4)	(5)		(A)	(°C)	50 Hz (A)	60 Hz (A)					
B40D10 B40D20 B40D40 B40D60 B40D80 B40D100 B40D120	B40C10 B40C20 B40C40 B40C60 B40C80 B40C100 B40C120	B40J10 B40J20 B40J40 B40J60 B40J80 B40J100 B40J120	100 200 400 600 800 1000 1200	40	85	550	575	1.31	0.60	M2	(2)	
B40H10	—	—	100									
B40H20	—	—	200									
B40H40	—	—	400									
B40H60	—	—	600									
B40H80	—	—	800									
B40H100	—	—	1000									
B40H120	—	—	1200									
IRKD56/04 IRKD56/06 IRKD56/08 IRKD56/10 IRKD56/12	IRKC56/04 IRKC56/06 IRKC56/08 IRKC56/10 IRKC56/12	IRKJ56/04 IRKJ56/06 IRKJ56/08 IRKJ56/10 IRKJ56/12	400 600 800 1000 1200	55	100	1350	1420	1.35	0.325	M4A	(2) (11)	
IRKD61/14	IRKC61/14	IRKJ61/14	1400									
IRKD61/16	IRKC61/16	IRKJ61/16	1600									
IRKD61/18	IRKC61/18	IRKJ61/18	1800									
IRKD61/20	IRKC61/20	IRKJ61/20	2000									
IRKD71/04 IRKD71/06 IRKD71/08 IRKD71/10 IRKD71/12	IRKC71/04 IRKC71/06 IRKC71/08 IRKC71/10 IRKC71/12	IRKJ71/04 IRKJ71/06 IRKJ71/08 IRKJ71/10 IRKJ71/12	400 600 800 1000 1200	70	100	1500	1570	1.30	0.285			
IRKD81/14	IRKC81/14	IRKJ81/14	1400									
IRKD81/16	IRKC81/16	IRKJ81/16	1600									
IRKD81/18	IRKC81/18	IRKJ81/18	1800									
IRKD81/20	IRKC81/20	IRKJ81/20	2000									
IRKD91/04 IRKD91/06 IRKD91/08 IRKD91/10 IRKD91/12	IRKC91/04 IRKC91/06 IRKC91/08 IRKC91/10 IRKC91/12	IRKJ91/04 IRKJ91/06 IRKJ91/08 IRKJ91/10 IRKJ91/12	400 600 800 1000 1200	90	100	1700	1780	1.30	0.22			
IRKD101/14	IRKC101/14	IRKJ101/14	1400									
IRKD101/16	IRKC101/16	IRKJ101/16	1600									
IRKD101/18	IRKC101/18	IRKJ101/18	1800									
IRKD101/20	IRKC101/20	IRKJ101/20	2000									

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50 Hz.

(3) Doubler circuit. All except for B40HH series.

(4) Center tap, circuit common cathode. Contact factory.

(5) Center tap, circuit common anode. Contact factory.

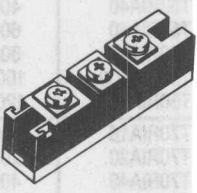
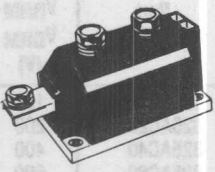
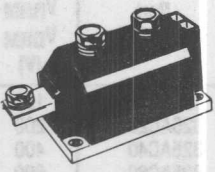
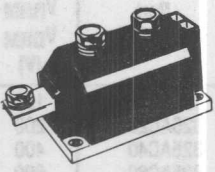
(7) 100% V_{RRM} reapplied. T_j = T_j max. = 150°C.

(8) For case outline drawing see page 178.

(9) V_{FM} at I_{FM} = I_{F(AV)} × π, T_j = 25°C.

(10) Two independent diodes.

(11) New generation of ADD-A-Pak modules are identified by a "/" (slash) in the part number instead of the "-" of the old part number.

Part Number			V _{RRM} (V)	I _{F(AV)} @ T _C		I _{FSM} (7)		(9) V _{FM} (V)	R _{thJC} DC (1) (K/W)	Case Outline Number (8)	Notes	Case Style
(3)	(4)	(5)		(A)	(°C)	50 Hz (A)	60 Hz (A)					
IRKD165-04	IRKC165-04	IRKJ165-04	400							M5	(6) (10)	
IRKD165-06	IRKC165-06	IRKJ165-06	600									
IRKD165-08	IRKC165-08	IRKJ165-08	800									
IRKD165-10	IRKC165-10	IRKJ165-10	1000									
IRKD165-12	IRKC165-12	IRKJ165-12	1200	165	100	3350	3500	1.57	0.10			
IRKD165-14	IRKC165-14	IRKJ165-14	1400									
IRKD165-16	IRKC165-16	IRKJ165-16	1600									
IRKD165-18	IRKC165-18	IRKJ165-18	1800									
IRKD165-20	IRKC165-20	IRKJ165-20	2000									
IRKD195-04	IRKC195-04	IRKJ195-04	400									
IRKD195-06	IRKC195-06	IRKJ195-06	600									
IRKD195-08	IRKC195-08	IRKJ195-08	800									
IRKD195-10	IRKC195-10	IRKJ195-10	1000									
IRKD195-12	IRKC195-12	IRKJ195-12	1200	195	100	4000	4200	1.32	0.10			
IRKD195-14	IRKC195-14	IRKJ195-14	1400									
IRKD195-16	IRKC195-16	IRKJ195-16	1600									
IRKD195-18	IRKC195-18	IRKJ195-18	1800									
IRKD195-20	IRKC195-20	IRKJ195-20	2000									
IRKD195-22	IRKC195-22	IRKJ195-22	2200									
IRKD195-24	IRKC195-24	IRKJ195-24	2400									
IRKD235-04	IRKC235-04	IRKJ235-04	400							M6		
IRKD235-06	IRKC235-06	IRKJ235-06	600									
IRKD235-08	IRKC235-08	IRKJ235-08	800									
IRKD235-10	IRKC235-10	IRKJ235-10	1000									
IRKD235-12	IRKC235-12	IRKJ235-12	1200	230	100	5500	5750	1.26	0.085			
IRKD235-14	IRKC235-14	IRKJ235-14	1400									
IRKD235-16	IRKC235-16	IRKJ235-16	1600									
IRKD235-18	IRKC235-18	IRKJ235-18	1800									
IRKD235-20	IRKC235-20	IRKJ235-20	2000									
IRKD250-04	IRKC250-04	IRKJ250-04	400									
IRKD250-06	IRKC250-06	IRKJ250-06	600									
IRKD250-08	IRKC250-08	IRKJ250-08	800									
IRKD250-10	IRKC250-10	IRKJ250-10	1000									
IRKD250-12	IRKC250-12	IRKJ250-12	1200	250	100	5900	6180	1.29	0.08			
IRKD250-14	IRKC250-14	IRKJ250-14	1400									
IRKD250-16	IRKC250-16	IRKJ250-16	1600									
IRKD250-18	IRKC250-18	IRKJ250-18	1800									
IRKD250-20	IRKC250-20	IRKJ250-20	2000									
IRKD270-04	IRKC270-04	IRKJ270-04	400							M6		
IRKD270-06	IRKC270-06	IRKJ270-06	600									
IRKD270-08	IRKC270-08	IRKJ270-08	800									
IRKD270-10	IRKC270-10	IRKJ270-10	1000									
IRKD270-12	IRKC270-12	IRKJ270-12	1200									
IRKD270-14	IRKC270-14	IRKJ270-14	1400									
IRKD270-16	IRKC270-16	IRKJ270-16	1600	270	100	7500	7850	1.48	0.063			
IRKD270-18	IRKC270-18	IRKJ270-18	1800									
IRKD270-20	IRKC270-20	IRKJ270-20	2000									
IRKD270-22	IRKC270-22	IRKJ270-22	2200									
IRKD270-24	IRKC270-24	IRKJ270-24	2400									
IRKD270-26	IRKC270-26	IRKJ270-26	2600									
IRKD270-28	IRKC270-28	IRKJ270-28	2800									
IRKD270-30	IRKC270-30	IRKJ270-30	3000									
IRKD320-04	IRKC320-04	IRKJ320-04	400							M6		
IRKD320-06	IRKC320-06	IRKJ320-06	600									
IRKD320-08	IRKC320-08	IRKJ320-08	800									
IRKD320-10	IRKC320-10	IRKJ320-10	1000									
IRKD320-12	IRKC320-12	IRKJ320-12	1200	320	100	8500	8900	1.28	0.063			
IRKD320-14	IRKC320-14	IRKJ320-14	1400									
IRKD320-16	IRKC320-16	IRKJ320-16	1600									
IRKD320-18	IRKC320-18	IRKJ320-18	1800									
IRKD320-20	IRKC320-20	IRKJ320-20	2000									
IRKD320-22	IRKC320-22	IRKJ320-22	2200									

(1) Value given for R_{thJC} is per module.
(3) Doubler circuit.

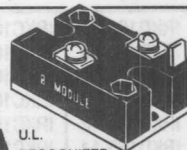
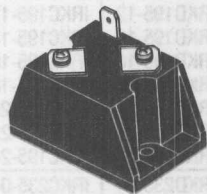
(4) Center tap, circuit common cathode. Contact factory.
(5) Center tap, circuit common anode. Contact factory.
(6) RMS isolation voltage: 3000V-50 Hz.

(7) 100% V_{RRM} reapplied. T_j = T_j max. = 150°C.
(8) For case outline drawing see page 178.
(9) V_{FM} at I_{FM} = I_{F(AV)} × π, T_j = 25°C.
(10) All devices can be supplied with non toxic material. Add suffix N to part number.

Power Modules

Thyristor

International
IOR Rectifier

Part Number	VRRM VDRM (V)	IT(AV) @ TC		ITSM (4)		(3) VTM (V)	RthJC DC (1) (K/W)	Case Outline Number (5)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)					
B25RIA10 B25RIA20 B25RIA40 B25RIA60 B25RIA80 B25RIA100 B25RIA120	100 200 400 600 800 1000 1200	25	70	330	345	1.60	1.05	M2(F)	(2)	 U.L. RECOGNIZED File no: E78996
T50RIA10 T50RIA20 T50RIA40 T50RIA60 T50RIA80 T50RIA100 T50RIA120	100 200 400 600 800 1000 1200	50	70	1100	1150	1.60	0.65	M3	(2)	 U.L. RECOGNIZED File no: E78996
T70RIA10 T70RIA20 T70RIA40 T70RIA60 T70RIA80 T70RIA100 T70RIA120	100 200 400 600 800 1000 1200	70	70	1400	1460	1.55	0.50			
T90RIA10 T90RIA20 T90RIA40 T90RIA60 T90RIA80 T90RIA100 T90RIA120	100 200 400 600 800 1000 1200	90	70	1500	1570	1.55	0.38			

(1) Value given for R_{thJC} is per module.

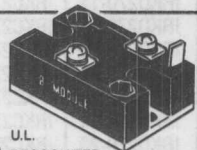
(2) RMS isolation voltage: 3500V-50 Hz.

(3) I_{TM} = I_{T(AV)} × π, T_j = 25°C.

(4) 100% V_{RRM} reapplied. T_j = 125°C.

(5) For case outline drawing see page 178.

Triac

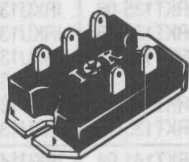
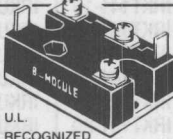
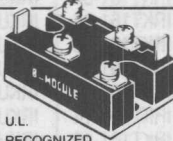
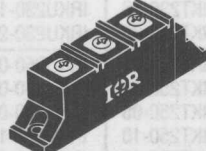
Part Number	V _{RRM} V _{DRM} (V)	I _{T(RMS)} @ T _C		I _{TSM} (3)		V _{TM} @ I _{TM}		R _{thJC} DC (1) (K/W)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)	(V)	(A)				
B25AC10 B25AC20 B25AC40 B25AC60 B25AC80 B25AC100 B25AC120	100 200 400 600 800 1000 1200	25	70	150	158	1.75	35	1.55	M2(H)	(2)	 U.L. RECOGNIZED File no: E78996
T50AC40A T50AC60A T50AC80A T50AC100A T50AC120A	400 600 800 1000 1200	50	75	520	550	2.00	70	0.70	M3		

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50 Hz.

(3) 100% V_{RRM} reapplied. T_j = 125°C.

(4) For case outline section see page 178.

Part Number			V _{RRM} V _{DRM} (V)	I _T (AV) @ T _c		I _{TSM} (7)		R _{thJC} DC (1) (K/W)	Case Outline Number (8)	Notes	Case Style
(3)	(4)	(5)		(A)	(°C)	50 Hz (A)	60 Hz (A)				
P171 P172 P173 P174 P175	— — — — —	— — — — —	400 600 800 1000 1200	12.5	85	300	315	1.12	M1	(6)	 U.L. RECOGNIZED File no: E78996
P471 P472 P473 P474 P475	— — — — —	— — — — —	400 600 800 1000 1200	20	85	325	340	0.525			
B25DS10 B25DS20 B25DS40 B25DS60 B25DS80 B25DS100 B25DS120	B25CS10 B25CS20 B25CS40 B25CS60 B25CS80 B25CS100 B25CS120	B25JS10 B25JS20 B25JS40 B25JS60 B25JS80 B25JS100 B25JS120	100 200 400 600 800 1000 1200	25	70	330	345	0.525	M2	(2)	 U.L. RECOGNIZED File no: E78996
B25H2S10 B25H2S20 B25H2S40 B25H2S60 B25H2S80 B25H2S100 B25H2S120	— — — — — — —	— — — — — — —	100 200 400 600 800 1000 1200	25	70	330	345	0.525	M2(G)	(2) (9)	 U.L. RECOGNIZED File no: E78996
IRKT26/04 IRKT26/06 IRKT26/08 IRKT26/10 IRKT26/12	IRKU26/04 IRKU26/06 IRKU26/08 IRKU26/10 IRKU26/12	IRKV26/04 IRKV26/06 IRKV26/08 IRKV26/10 IRKV26/12	400 600 800 1000 1200	25	85	385	400	0.400	M4A	(10) (2)	 PENDING U.L. RECOGNITION
IRKT26/14 IRKT26/16 IRKT26/18	IRKU26/14 IRKU26/16 IRKU26/18	IRKV26/14 IRKV26/16 IRKV26/18	1400 1600 1800	25	80	450	470	0.400			
IRKT41/04 IRKT41/06 IRKT41/08 IRKT41/10 IRKT41/12	IRKU41/04 IRKU41/06 IRKU41/08 IRKU41/10 IRKU41/12	IRKV41/04 IRKV41/06 IRKV41/08 IRKV41/10 IRKV41/12	400 600 800 1000 1200	40	85	715	750	0.300			
IRKT41/14 IRKT41/16 IRKT41/18	IRKU41/14 IRKU41/16 IRKU41/18	IRKV41/14 IRKV41/16 IRKV41/18	1400 1600 1800	40	80	650	680	0.300			
IRKT56/04 IRKT56/06 IRKT56/08 IRKT56/10 IRKT56/12	IRKU56/04 IRKU56/06 IRKU56/08 IRKU56/10 IRKU56/12	IRKV56/04 IRKV56/06 IRKV56/08 IRKV56/10 IRKV56/12	400 600 800 1000 1200	55	85	1100	1150	0.250			
IRKT56/14 IRKT56/16 IRKT56/18	IRKU56/14 IRKU56/16 IRKU56/18	IRKV56/14 IRKV56/16 IRKV56/18	1400 1600 1800	55	80	1050	1100	0.250			
IRKT71/04 IRKT71/06 IRKT71/08 IRKT71/10 IRKT71/12	IRKU71/04 IRKU71/06 IRKU71/08 IRKU71/10 IRKU71/12	IRKV71/04 IRKV71/06 IRKV71/08 IRKV71/10 IRKV71/12	400 600 800 1000 1200	70	85	1400	1470	0.195			
IRKT71/14 IRKT71/16 IRKT71/18	IRKU71/14 IRKU71/16 IRKU71/18	IRKV71/14 IRKV71/16 IRKV71/18	1400 1600 1800	70	80	1300	1360	0.195			
IRKT91/04 IRKT91/06 IRKT91/08 IRKT91/10 IRKT91/12	IRKU91/04 IRKU91/06 IRKU91/08 IRKU91/10 IRKU91/12	IRKV91/04 IRKV91/06 IRKV91/08 IRKV91/10 IRKV91/12	400 600 800 1000 1200	90	85	1400	1470	0.145			
IRKT91/14 IRKT91/16 IRKT91/18	IRKU91/14 IRKU91/16 IRKU91/18	IRKV91/14 IRKV91/16 IRKV91/18	1400 1600 1800	90	80	1300	1360	0.145			

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50 Hz.

(3) Doubler circuit, positive control.

All except for B25H2 series.

(4) Center tap, circuit common
cathode - contact factory.

(5) Center tap, circuit common anode - contact factory.

(6) RMS isolation voltage: 2500V-50 Hz.

(7) 100% V_{RRM} reapplied. T_j = T_j max. = 125°C.

(8) For case outline drawing see page 178.

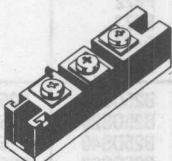
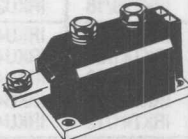
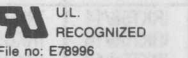
(9) Two independent SCRs.

(10) New generation of ADD-A-Pak modules are
identified by a "/" (slash) in the part number
instead of the "-" of the old part number.

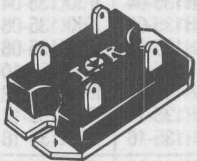
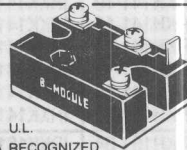
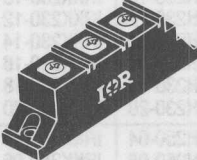
Power Modules

Thyristor/Thyristor

International
IOR Rectifier

Part Number			V _{RRM} V _{DRM} (V)	I _T (AV) @ T _C		I _{TSM} (7)		R _{thJC} DC (1) (K/W)	Case Outline Number (8)	Notes	Case Style			
(3)	(4)	(5)		(A)	(°C)	50 Hz (A)	60 Hz (A)							
IRKT135-04	IRKU135-04	IRKV135-04	400	135	85	2700	2800	0.10	M5	(2) (9)				
IRKT135-06	IRKU135-06	IRKV135-06	600											
IRKT135-08	IRKU135-08	IRKV135-08	800											
IRKT135-10	IRKU135-10	IRKV135-10	1000											
IRKT135-12	IRKU135-12	IRKV135-12	1200											
IRKT135-14	IRKU135-14	IRKV135-14	1400											
IRKT135-16	IRKU135-16	IRKV135-16	1600											
IRKT141-04	IRKU141-04	IRKV141-04	400	140	85	4000	4200	0.085						
IRKT141-06	IRKU141-06	IRKV141-06	600											
IRKT141-08	IRKU141-08	IRKV141-08	800											
IRKT141-10	IRKU141-10	IRKV141-10	1000											
IRKT141-12	IRKU141-12	IRKV141-12	1200											
IRKT141-14	IRKU141-14	IRKV141-14	1400											
IRKT141-16	IRKU141-16	IRKV141-16	1600											
IRKT141-18	IRKU141-18	IRKV141-18	1800											
IRKT141-20	IRKU141-20	IRKV141-20	2000											
IRKT161-04	IRKU161-04	IRKV161-04	400	160	85	4300	4500	0.085						
IRKT161-06	IRKU161-06	IRKV161-06	600											
IRKT161-08	IRKU161-08	IRKV161-08	800											
IRKT161-10	IRKU161-10	IRKV161-10	1000											
IRKT161-12	IRKU161-12	IRKV161-12	1200											
IRKT161-14	IRKU161-14	IRKV161-14	1400											
IRKT161-16	IRKU161-16	IRKV161-16	1600											
IRKT170-04	IRKU170-04	IRKV170-04	400	170	85	4300	4500	0.085	M6					
IRKT170-06	IRKU170-06	IRKV170-06	600											
IRKT170-08	IRKU170-08	IRKV170-08	800											
IRKT170-10	IRKU170-10	IRKV170-10	1000											
IRKT170-12	IRKU170-12	IRKV170-12	1200											
IRKT170-14	IRKU170-14	IRKV170-14	1400											
IRKT170-16	IRKU170-16	IRKV170-16	1600											
IRKT230-04	IRKU230-04	IRKV230-04	400	230	85	6300	6600	0.063						
IRKT230-06	IRKU230-06	IRKV230-06	600											
IRKT230-08	IRKU230-08	IRKV230-08	800											
IRKT230-10	IRKU230-10	IRKV230-10	1000											
IRKT230-12	IRKU230-12	IRKV230-12	1200											
IRKT230-14	IRKU230-14	IRKV230-14	1400											
IRKT230-16	IRKU230-16	IRKV230-16	1600											
IRKT230-18	IRKU230-18	IRKV230-18	1800											
IRKT230-20	IRKU230-20	IRKV230-20	2000											
IRKT250-04	IRKU250-04	IRKV250-04	400	250	85	7150	7500	0.063						
IRKT250-06	IRKU250-06	IRKV250-06	600											
IRKT250-08	IRKU250-08	IRKV250-08	800											
IRKT250-10	IRKU250-10	IRKV250-10	1000											
IRKT250-12	IRKU250-12	IRKV250-12	1200											
IRKT250-14	IRKU250-14	IRKV250-14	1400											
IRKT250-16	IRKU250-16	IRKV250-16	1600											

- (1) Value given for R_{thJC} is per module.
- (2) RMS isolation voltage: 3000V-50 Hz.
- (3) Doubler circuit, positive control.
- (4) Center tap, circuit common cathode. Contact factory
- (5) Center tap, circuit common anode. Contact factory
- (7) 100% V_{RRM} reapplied. T_j = T_j max. = 125°C.
- (8) For case outline drawing see page 178.
- (9) All devices can be supplied with non toxic material. Add suffix N to part number.

Part Number				V _{RRM} V _{DRM} (V)	T _A (V) @ T _C I _F (A)		T _{SM} , I _{FSM} (9)		R _{thJC} DC (1) (K/W)	Case Outline Number (10)	Notes	Case Style
(3)	(4)	(5)	(6)		(A)	(°C)	50 Hz (A)	60 Hz (A)				
P161 P162 P163 P164 P165	— — — — —	— — — — —	— — — — —	400 600 800 1000 1200	12.5	85	300	315	1.12	M1	(7)	 U.L. RECOGNIZED File no: E78996
P461 P462 P463 P464 P465	— — — — —	— — — — —	— — — — —	400 600 800 1000 1200	20	85	325	340	0.525			
B25DA10 B25DA20 B25DA40 B25DA60 B25DA80 B25DA100 B25DA120	— — — — — — —	B25DC10 B25DC20 B25DC40 B25DC60 B25DC80 B25DC100 B25DC120	— — — — — — —	100 200 400 600 800 1000 1200	25	70	330	345	0.525	M2	(2)	 U.L. RECOGNIZED File no: E78996
IRKH26/04 IRKH26/06 IRKH26/08 IRKH26/10 IRKH26/12	IRKK26/04 IRKK26/06 IRKK26/08 IRKK26/10 IRKK26/12	IRKL26/04 IRKL26/06 IRKL26/08 IRKL26/10 IRKL26/12	IRKN26/04 IRKN26/06 IRKN26/08 IRKN26/10 IRKN26/12	400 600 800 1000 1200	25	85	500	525	0.400	M4A	(2) (11)	
IRKH26/14 IRKH26/16 IRKH26/18	IRKK26/14 IRKK26/16 IRKK26/18	IRKL26/14 IRKL26/16 IRKL26/18	IRKN26/14 IRKN26/16 IRKN26/18	1400 1600 1800	25	85	450	470	0.400			 PENDING U.L. RECOGNITION
IRKH41/04 IRKH41/06 IRKH41/08 IRKH41/10 IRKH41/12	IRKK41/04 IRKK41/06 IRKK41/08 IRKK41/10 IRKK41/12	IRKL41/04 IRKL41/06 IRKL41/08 IRKL41/10 IRKL41/12	IRKN41/04 IRKN41/06 IRKN41/08 IRKN41/10 IRKN41/12	400 600 800 1000 1200	40	85	715	750	0.300			
IRKH41/14 IRKH41/16 IRKH41/18	IRKK41/14 IRKK41/16 IRKK41/18	IRKL41/14 IRKL41/16 IRKL41/18	IRKN41/14 IRKN41/16 IRKN41/18	1400 1600 1800	40	80	650	680	0.300			
IRKH56/04 IRKH56/06 IRKH56/08 IRKH56/10 IRKH56/12	IRKK56/04 IRKK56/06 IRKK56/08 IRKK56/10 IRKK56/12	IRKL56/04 IRKL56/06 IRKL56/08 IRKL56/10 IRKL56/12	IRKN56/04 IRKN56/06 IRKN56/08 IRKN56/10 IRKN56/12	400 600 800 1000 1200	55	85	1100	1150	0.250			
IRKH56/14 IRKH56/16 IRKH56/18	IRKK56/14 IRKK56/16 IRKK56/18	IRKL56/14 IRKL56/16 IRKL56/18	IRKN56/14 IRKN56/16 IRKN56/18	1400 1600 1800	55	80	1050	1100	0.250			
IRKH71/04 IRKH71/06 IRKH71/08 IRKH71/10 IRKH71/12	IRKK71/04 IRKK71/06 IRKK71/08 IRKK71/10 IRKK71/12	IRKL71/04 IRKL71/06 IRKL71/08 IRKL71/10 IRKL71/12	IRKN71/04 IRKN71/06 IRKN71/08 IRKN71/10 IRKN71/12	400 600 800 1000 1200	70	85	1400	1470	0.195			
IRKH71/14 IRKH71/16 IRKH71/18	IRKK71/14 IRKK71/16 IRKK71/18	IRKL71/14 IRKL71/16 IRKL71/18	IRKN71/14 IRKN71/16 IRKN71/18	1400 1600 1800	70	85	1300	1360	0.195			
IRKH91/04 IRKH91/06 IRKH91/08 IRKH91/10 IRKH91/12	IRKK91/04 IRKK91/06 IRKK91/08 IRKK91/10 IRKK91/12	IRKL91/04 IRKL91/06 IRKL91/08 IRKL91/10 IRKL91/12	IRKN91/04 IRKN91/06 IRKN91/08 IRKN91/10 IRKN91/12	400 600 800 1000 1200	90	85	1500	1570	0.145			
IRKH91/14 IRKH91/16 IRKH91/18	IRKK91/14 IRKK91/16 IRKK91/18	IRKL91/14 IRKL91/16 IRKL91/18	IRKN91/14 IRKN91/16 IRKN91/18	1400 1600 1800	90	80	1435	1500	0.145			

 (1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3500V-50 Hz.

(3) Doubler circuit, positive control.

(4) Center tap, circuit common cathode - contact factory.

(5) Doubler circuit, negative control.

(6) Center tap, circuit common anode - contact factory.

(7) RMS isolation voltage: 2500V-50 Hz.

 (9) 100% V_{RRM} reapplied. T_j = T_j max. = 125°C.

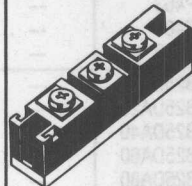
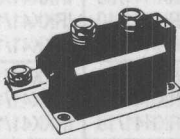
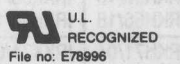
(10) For case outline drawing see page 178.

(11) New generation of ADD-A-Pak modules are identified by a "/" (slash) in the part number instead of the "-" of the old part number.

Power Modules

Thyristor/Diode

International
IOR Rectifier

Part Number				VRRM VDRM (V)	I _T (AV) @ T _C I _F (AV)		I _{TSM} , I _{FSM} (9)		R _{thJC} DC (1) (K/W)	Case Outline Number (10)	Notes	Case Style
(3)	(4)	(5)	(6)		(A)	(°C)	50 Hz (A)	60 Hz (A)				
IRKH135-04	IRKK135-04	IRKL135-04	IRKN135-04	400						M5	(8) (11)	
IRKH135-06	IRKK135-06	IRKL135-06	IRKN135-06	600								
IRKH135-08	IRKK135-08	IRKL135-08	IRKN135-08	800								
IRKH135-10	IRKK135-10	IRKL135-10	IRKN135-10	1000	135	85	2700	2800	0.100			
IRKH135-12	IRKK135-12	IRKL135-12	IRKN135-12	1200								
IRKH135-14	IRKK135-14	IRKL135-14	IRKN135-14	1400								
IRKH135-16	IRKK135-16	IRKL135-16	IRKN135-16	1600								
IRKH141-04	IRKK141-04	IRKL141-04	IRKN141-04	400								
IRKH141-06	IRKK141-06	IRKL141-06	IRKN141-06	600								
IRKH141-08	IRKK141-08	IRKL141-08	IRKN141-08	800								
IRKH141-10	IRKK141-10	IRKL141-10	IRKN141-10	1000	140	85	4000	4200	0.085			
IRKH141-12	IRKK141-12	IRKL141-12	IRKN141-12	1200								
IRKH141-14	IRKK141-14	IRKL141-14	IRKN141-14	1400								
IRKH141-16	IRKK141-16	IRKL141-16	IRKN141-16	1600								
IRKH141-18	IRKK141-18	IRKL141-18	IRKN141-18	1800								
IRKH141-20	IRKK141-20	IRKL141-20	IRKN141-20	2000								
IRKH161-04	IRKK161-04	IRKL161-04	IRKN161-04	400						M6		
IRKH161-06	IRKK161-06	IRKL161-06	IRKN161-06	600								
IRKH161-08	IRKK161-08	IRKL161-08	IRKN161-08	800								
IRKH161-10	IRKK161-10	IRKL161-10	IRKN161-10	1000	160	85	4300	4500	0.085			
IRKH161-12	IRKK161-12	IRKL161-12	IRKN161-12	1200								
IRKH161-14	IRKK161-14	IRKL161-14	IRKN161-14	1400								
IRKH161-16	IRKK161-16	IRKL161-16	IRKN161-16	1600								
IRKH170-04	IRKK170-04	IRKL170-04	IRKN170-04	400								
IRKH170-06	IRKK170-06	IRKL170-06	IRKN170-06	600								
IRKH170-08	IRKK170-08	IRKL170-08	IRKN170-08	800								
IRKH170-10	IRKK170-10	IRKL170-10	IRKN170-10	1000	170	85	4300	4500	0.085			
IRKH170-12	IRKK170-12	IRKL170-12	IRKN170-12	1200								
IRKH170-14	IRKK170-14	IRKL170-14	IRKN170-14	1400								
IRKH170-16	IRKK170-16	IRKL170-16	IRKN170-16	1600								
IRKH230-04	IRKK230-04	IRKL230-04	IRKN230-04	400								
IRKH230-06	IRKK230-06	IRKL230-06	IRKN230-06	600								
IRKH230-08	IRKK230-08	IRKL230-08	IRKN230-08	800								
IRKH230-10	IRKK230-10	IRKL230-10	IRKN230-10	1000	230	85	6300	6600	0.063			
IRKH230-12	IRKK230-12	IRKL230-12	IRKN230-12	1200								
IRKH230-14	IRKK230-14	IRKL230-14	IRKN230-14	1400								
IRKH230-16	IRKK230-16	IRKL230-16	IRKN230-16	1600								
IRKH230-18	IRKK230-18	IRKL230-18	IRKN230-18	1800								
IRKH230-20	IRKK230-20	IRKL230-20	IRKN230-20	2000								
IRKH250-04	IRKK250-04	IRKL250-04	IRKN250-04	400								
IRKH250-06	IRKK250-06	IRKL250-06	IRKN250-06	600								
IRKH250-08	IRKK250-08	IRKL250-08	IRKN250-08	800								
IRKH250-10	IRKK250-10	IRKL250-10	IRKN250-10	1000	250	85	7150	7500	0.063			
IRKH250-12	IRKK250-12	IRKL250-12	IRKN250-12	1200								
IRKH250-14	IRKK250-14	IRKL250-14	IRKN250-14	1400								
IRKH250-16	IRKK250-16	IRKL250-16	IRKN250-16	1600								
IRKH250-18	IRKK250-18	IRKL250-18	IRKN250-18	1800								

(1) Value given for R_{thJC} is per module.

(3) Doubler circuit, positive control.

(4) Center tap, circuit common cathode – contact factory.

(5) Doubler circuit, negative control.

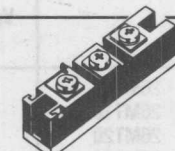
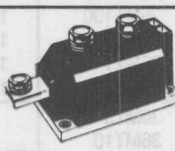
(6) Center tap, circuit common anode – contact factory.

(8) RMS isolation voltage: 3000V–50 Hz.

(9) 100% VRRM reapplied. T_j = T_j max. = 125°C.

(10) For case outline drawing see page 178.

(11) All devices can be supplied with non toxic material. Add suffix N to part number.

Part Number (3) (4)		Voltage Range		I _T (AV) @ T _C I _F (AV)		I _{TSM} , I _{FSM} (5)		R _{thJC} DC (1) (K/W)	Case Outline Number (6)	Notes	Case Style
		Thyristor (V)	Diode (V)	(A)	(°C)	50 Hz (A)	60 Hz (A)				
IRKH135-14D20 IRKH135-16D25	IRKL135-14D20 IRKL135-16D25	1400 1600	2000 2500	135	85	2700	2800	0.100	M5	(2)	 U.L. RECOGNIZED File no: E78996
IRKH141-14D20 IRKH141-16D25 IRKH141-18D28 IRKH141-20D32	IRKL141-14D20 IRKL141-16D25 IRKL141-18D28 IRKL141-20D32	1400 1600 1800 2000	2000 2500 2800 3200	140	85	4000	4200	0.085			
IRKH161-14D20 IRKH161-16D25	IRKL161-14D20 IRKL161-16D25	1400 1600	2000 2500	160	85	4300	4500	0.085			
IRKH170-14D20 IRKH170-16D25	IRKL170-14D20 IRKL170-16D25	1400 1600	2000 2500	170	85	4300	4500	0.085	M6		 U.L. RECOGNIZED File no: E78996
IRKH230-14D20 IRKH230-16D25 IRKH230-18D28 IRKH230-20D32	IRKL230-14D20 IRKL230-16D25 IRKL230-18D28 IRKL230-20D32	1400 1600 1800 2000	2000 2500 2800 3200	230	85	6300	6600	0.063			
IRKH250-14D20 IRKH250-16D25	IRKL250-14D20 IRKL250-16D25	1400 1600	2000 2500	250	85	7150	7500	0.063			

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 3000V-50 Hz.

(3) Doubler circuit, positive control.

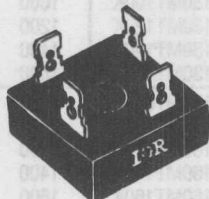
(4) Doubler circuit, negative control.

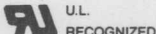
(5) 100% VRRM reapplied. T_j = T_j max. = 125°C.

(6) For case outline drawing see page 178.

Single Phase Diode Bridges

10-35 Amps

Part Number		VRRM (V)	I _O T _C		VFM @ I _F		IFSM (3)		R _{thJC} DC (1) (K/W)	Case Outline Number (4)	Notes	Case Style
	U.S. Series		(A)	(°C)	(V)	(A)	50 Hz (A)	60 Hz (A)				
	100JB05L 100JB1L 100JB2L 100JB4L 100JB6L 100JB8L 100JB10L 100JB12L 100JB14L 100JB16L	50 100 200 400 600 800 1000 1200 1400 1600	10	65	1.3	16	125	130	3.5	B1	(2)	D-34A
26MB05A 26MB10A 26MB20A 26MB40A 26MB60A 26MB80A 26MB100A 26MB120A 26MB140A 26MB160A	250JB05L 250JB1L 250JB2L 250JB4L 250JB6L 250JB8L 250JB10L 250JB12L 250JB14L 250JB16L	50 100 200 400 600 800 1000 1200 1400 1600	25	65	1.1	55	335	350	1.7			
36MB05A 36MB10A 36MB20A 36MB40A 36MB60A 36MB80A 36MB100A 36MB120A 36MB140A 36MB160A	35MB05A 35MB10A 35MB20A 35MB40A 35MB60A 35MB80A 35MB100A 35MB120A 35MB140A 35MB160A	50 100 200 400 600 800 1000 1200 1400 1600	35	60	1.2	55	400	420	1.2			



U.L.
RECOGNIZED

File no: E62320

(1) Value given for R_{thJC} is per module.

(2) RMS isolation voltage: 2700V-50 Hz.

(3) 100% VRRM reapplied. T_j = T_j max. = 150°C.

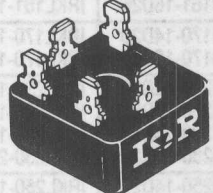

(4) For case outline drawing see page 176.

Power Modules

Three Phase Diode Bridges

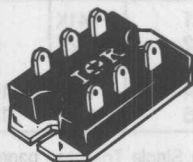
25-210 Amps


International
IOR Rectifier

Part Number	V _{RRM} (V)	I _O T _C		V _{FM} @ I _F		I _{FSM} (4)		R _{thJC} DC (1) (K/W)	Case Outline Number (5)	Notes	Case Style
		(A)	(°C)	(V)	(A)	50 Hz (A)	60 Hz (A)				
26MT5 26MT10 26MT20 26MT40 26MT60 26MT80 26MT100 26MT120 26MT140 26MT160	50 100 200 400 600 800 1000 1200 1400 1600	25	70	1.26	40	300	314	1.42	B2	(3)	D-63
36MT5 36MT10 36MT20 36MT40 36MT60 36MT80 36MT100 36MT120 36MT140 36MT160	50 100 200 400 600 800 1000 1200 1400 1600	35	60	1.19	40	400	420	1.16			 U.L. RECOGNIZED File no: E62320
60MT80K 60MT100K 60MT120K 60MT140K 60MT160	800 1000 1200 1400 1600	60	85	1.75	100	350	370	0.370	B3	(2)	
70MT80K 70MT100K 70MT120K 70MT140K 70MT160	800 1000 1200 1400 1600	70	85	1.55	100	400	420	0.292			
90MT80K 90MT100K 90MT120K 90MT140K 90MT160	800 1000 1200 1400 1600	90	90	1.6	150	650	680	0.210			
110MT80K 110MT100K 110MT120K 110MT140K 110MT160K	800 1000 1200 1400 1600	110	90	1.4	150	800	840	0.178			
130MT80K 130MT100K 130MT120K 130MT140K 130MT160K	800 1000 1200 1400 1600	130	85	1.63	200	950	1000	0.155			
160MT80K 160MT100K 160MT120K 160MT140K 160MT160K	800 1000 1200 1400 1600	160	85	1.49	200	1200	1260	0.121			

- (1) Value given for R_{thJC} is per module.
(2) RMS isolation voltage: 4000V-50 Hz.
(3) RMS isolation voltage: 2700V-50 Hz.

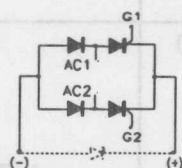
- (4) 100% V_{RRM} reapplied. T_j = T_j max. = 150°C.
(5) For case outline drawing see page 176.

Part Number				V _{RRM} (V)	I _O T _C I _(RMS)			I _T (AV) I _F (AV) (A)	I _{TSM} , I _{FSM} (7)		R _{thJC} DC (1) (K/W)	Circuit Number	Case Outline Number (8)	Notes	Case style
(3)	(4)	(5)	(A)		(°C)	(A)	50 Hz (A)		60 Hz (A)						
P101	P101K	P101W	P101KW	400	25	85	28	12.5	300	315	0.56	0	M1	(2)	
P102	P102K	P102W	P102KW	600											
P103	P103K	P103W	P103KW	800											
P104	P104K	P104W	P104KW	1000											
P105	P105K	P105W	P105KW	1200											
P111	P111K	P111W	P111KW	400	25	85	28	12.5	300	315	0.56	1			
P112	P112K	P112W	P112KW	600											
P113	P113K	P113W	P113KW	800											
P114	P114K	P114W	P114KW	1000											
P115	P115K	P115W	P115KW	1200											
P121	P121K	P121W	P121KW	400	25	85	28	12.5	300	315	0.56	2			
P122	P122K	P122W	P122KW	600											
P123	P123K	P123W	P123KW	800											
P124	P124K	P124W	P124KW	1000											
P125	P125K	P125W	P125KW	1200											
P131	P131K	—	—	400	25	85	28	12.5	300	315	0.56	3			
P132	P132K	—	—	600											
P133	P133K	—	—	800											
P134	P134K	—	—	1000											
P135	P135K	—	—	1200											
P401	P401K	P401W	P401KW	400	40	85	44	20	325	340	0.263	0			
P402	P402K	P402W	P402KW	600											
P403	P403K	P403W	P403KW	800											
P404	P404K	P404W	P404KW	1000											
P405	P405K	P405W	P405KW	1200											
P411	P411K	P411W	P411KW	400	40	85	44	20	325	340	0.263	1			
P412	P412K	P412W	P412KW	600											
P413	P413K	P413W	P413KW	800											
P414	P414K	P414W	P414KW	1000											
P415	P415K	P415W	P415KW	1200											
P421	P421K	P421W	P421KW	400	40	85	44	20	325	340	0.263	2			
P422	P422K	P422W	P422KW	600											
P423	P423K	P423W	P423KW	800											
P424	P424K	P424W	P424KW	1000											
P425	P425K	P425W	P425KW	1200											
P431	P431K	—	—	400	40	85	44	20	325	340	0.263	3			
P432	P432K	—	—	600											
P433	P433K	—	—	800											
P434	P434K	—	—	1000											
P435	P435K	—	—	1200											

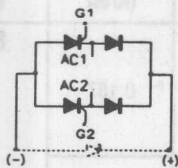


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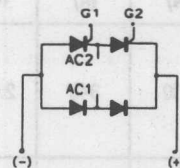
Circuit "0"



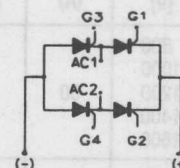
Circuit "1"



Circuit "2"



Circuit "3"



- (1) Value given for R_{thJC} is per module.
 (2) RMS isolation voltage: 2500V-50 Hz.
 (3) This series offers voltage suppression.
 (4) This series offers free wheeling diode.

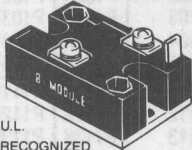
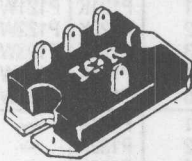
- (5) This series offers both voltage suppression and free wheeling diode.
 (7) T_j = T_j max. = 125°C, 100% V_{RRM} reapplied.
 (8) For case outline drawing see page 178.

Power Modules

AC Controllers

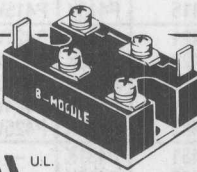
International
Rectifier

Single Phase (Back to Back SCRs)

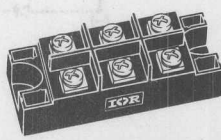
Part Number		V_{RRM} V_{DRM} (V)	$I_T(RMS)$ @ T_C		I_{TSM} (5)		V_{TM} @ I_{TM}		R_{thJC} (6) (K/W)	Case Outline Number (4)	Notes	Case Style
	(1)		(A)	(°C)	50 Hz (A)	60 Hz (A)	(V)	(A)				
B40A10 B40A20 B40A40 B40A60 B40A80 B40A100 B40A120	— — — — — — —	100 200 400 600 800 1000 1200	40	97	330	345	1.6	75	0.525	M2(J)	(2)	 U.L. RECOGNIZED File no: E78996
P141 P142 P143 P144 P145	P141K P142K P143K P144K P145K	400 600 800 1000 1200	28	85	300	315	1.35	40	1.12	M1	(3)	 U.L. RECOGNIZED File no: E78996
P441 P442 P443 P444 P445	P441K P442K P443K P444K P445K	400 600 800 1000 1200	44	85	325	340	1.35	65	0.58			

*For a Single Triac see page 106.

Two Phase (Two Triacs)

Part Number	V_{RRM} V_{DRM} (V)	$I_T(RMS)$ @ T_C		I_{TSM} (5)		V_{TM} @ I_{TM}		R_{thJC} DC (6) (K/W)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)	(V)	(A)				
B25A2C10 B25A2C20 B25A2C40 B25A2C60 B25A2C80 B25A2C100 B25A2C120	100 200 400 600 800 1000 1200	25	70	180	188	1.75	35	0.78	M2(I)	(2)	 U.L. RECOGNIZED File no: E78996

Three Phase (3 Back to Back SCRs)

Part Number	V_{RRM} V_{DRM} (V)	$I_T(RMS)$ @ T_C		I_{TSM} (5)		V_{TM} @ I_{TM}		R_{thJC} DC (6) (K/W)	Case Outline Number (4)	Notes	Case Style
		(A)	(°C)	50 Hz (A)	60 Hz (A)	(V)	(A)				
54MT80K 54MT100K 54MT120K 54MT140K 54MT160K	800 1000 1200 1400 1600	50	80	330	345	2.68	150	0.187	B5	(7)	
94MT80K 94MT100K 94MT120K 94MT140K 94MT160K	800 1000 1200 1400 1600	90	80	800	840	1.55	150	0.137			
104MT80K 104MT100K 104MT120K 104MT140K 104MT160K	800 1000 1200 1400 1600	100	80	950	1000	1.53	150	0.119			

(1) This series offers voltage suppression.

(2) RMS Isolation voltage 3500VAC.

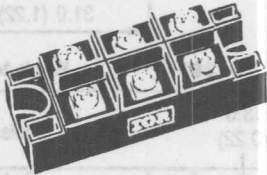
(3) RMS Isolation voltage 2500VAC.

(4) For case outline drawing see page 176, 178.

(5) 100% V_{RRM} applied $T_j = 125^\circ\text{C}$.

(6) Per module.

(7) RMS Isolation voltage 4000VAC.

Part Number			V _{RRM} V _{DRM} (V)	I _O (DC) @ T _C		I _{TSM} (8)		V _{TM} (1) (V)	R _{thJC} DC (2) (K/W)	CASE	Notes	Case Style
(4)	(5)	(6)		(A)	(°C)	50 Hz (A)	60 Hz (A)			Outline Number (9)		
51MT80K	52MT80K	53MT80K	800	55	85	330	345	2.68	0.179	B4	(3)	
51MT100K	52MT100K	53MT100K	1000									
51MT120K	52MT120K	53MT120K	1200									
51MT140K	52MT140K	53MT140K	1000									
51MT160K	52MT160K	53MT160K	1600									
91MT80K	92MT80K	93MT80K	800	90	85	800	840	1.65	0.144			
91MT100K	92MT100K	93MT100K	1000									
91MT120K	92MT120K	93MT120K	1200									
91MT140K	92MT140K	93MT140K	1400									
91MT160K	92MT160K	93MT160K	1600									
111MT80K	112MT80K	113MT80K	800	110	85	950	1000	1.57	0.117			
111MT100K	112MT100K	113MT100K	1000									
111MT120K	112MT120K	113MT120K	1200									
111MT140K	112MT140K	113MT140K	1400									
111MT160K	112MT160K	113MT160K	1600									

(1) I_{peak} = 150A, T_j = 25°C.

(2) Value given for R_{thJC} is per module DC operation.

(3) RMS Isolation voltage: 4000V-50 Hz.

(4) Three phase negative controlled bridge.

(5) Three phase positive controlled bridge.

(6) Three phase fully controlled bridge.

(8) 100% V_{RRM} reapplied. T_j = T_j max. = 125°C

(9) For case outline see 178.

ADD-A-Pak Part Number Coding

“ / ” – Identifies the **NEW** Generation

IRK D L 56 / 12 S10 Part Number coding

① ② ③ ④ ⑤ ⑥

1 – Module type

2 – Circuit Configuration
(See Circuit configuration table)

3 – No letter = Standard recovery
L = Fast recovery diode

4 – Current rating *: I_T (AV) = code value
with last digit rounded off “0” or “5”

5 – Voltage code: Code x 100 = V_{RRM}

*With auxiliary cathode last digit = “1” or “6”
For no auxiliary cathode last digit = “2” or “7”

“ = ” – Identifies the **OLD** construction

IRK D L 56 – 12 S10

① ② ③ ④ ⑤ ⑥

6 – No code = Standard recovery (diodes)
dv/dt = 500V/μs (thyristors)
Code = trr (fast diodes)
dv/dt (thyristors)

trr

S02 = 200ns

S05 = 500ns

S10 = 1000ns

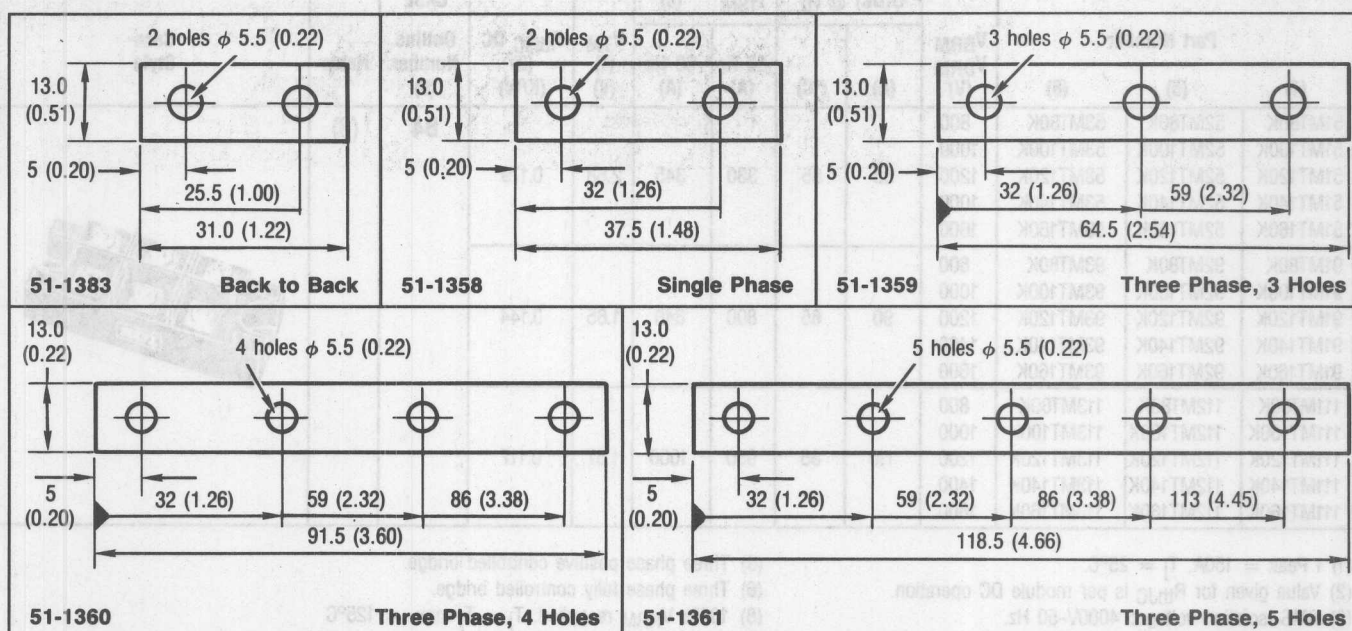
dv/dt

S90 = 1000V/μs

Power Modules Hardware

**International
IOR Rectifier**

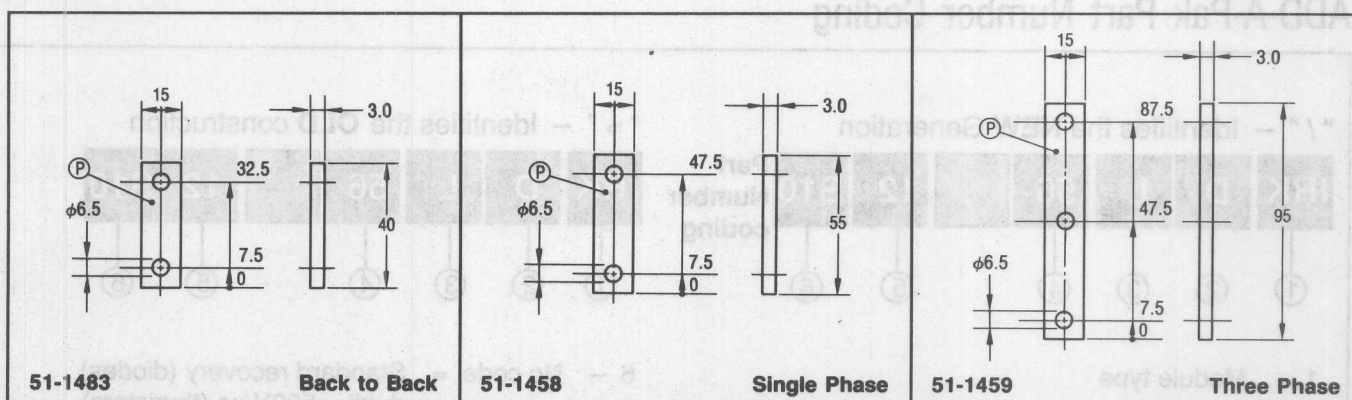
Busbars — Add-A-Pak



All busbars are 3mm thick.

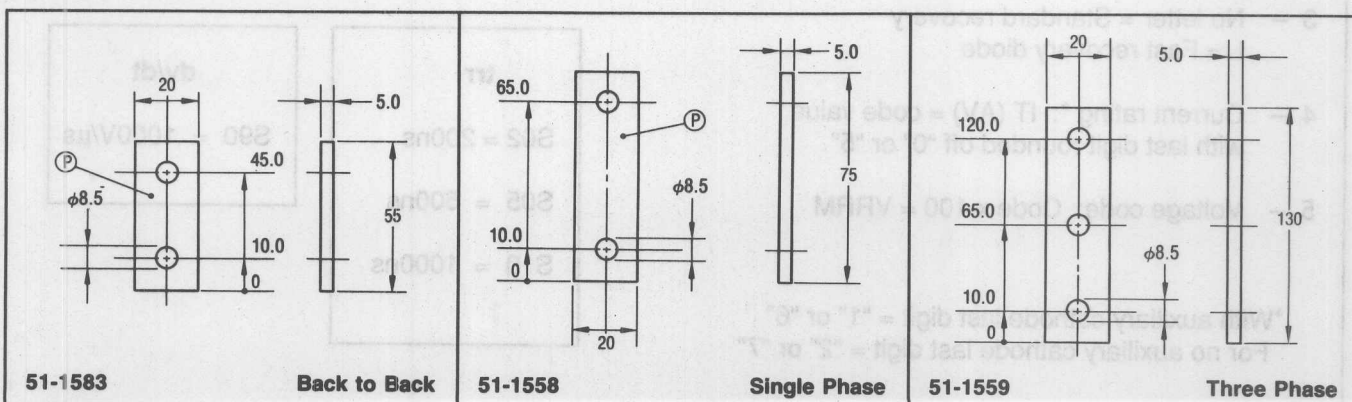
All dimensions in millimeter and (inches)

Busbars — Int-A-Pak



All dimensions in millimeter

Busbars — Magn-A-Pak



All dimensions in millimeters

Government/ Space Products

A. Voltage temperature stress tests at both ambient and elevated conditions.
B. Five air operation life. Test capability, 1000 positions for power transistor, and 1800 positions for power diodes.
C. Computerized test equipment.
D. Interim test equipment.
E. Computerized test equipment.
F. Interim test equipment.

TEST	CAPABILITY
Acceleration, Sustained Centrifuge	50-50,000g (Standard)
Altitude (Barometric)	450,000 ft. Simulated Altitude in TA - 25°C
Pressure, Barometric	25-55°C 50% RH
Mechanical Resistance	25°C to 75°C, up to 20W Salt Solution by Weight
Salt Atmosphere/Spray	1 x 10 ⁻⁵ atm. Corrosive Fluorocarbon, Mineral Oil, PC-43, Hydrocarbon Pressure: 0-100 psig
Salt-Glass, Pin Test	Permanent Marking
Synthetic Resistance to Solvents	Pulse Shock - approximately Half-sine
Shock (Mechanical)	500-1500g at 0.5-1.0 msec
Solderability	Up to 250°C
Temperature Cycling	-55°C to 200°C
Tensile Strength (Load Integrity)	Lead Pad, Pad, Tension, Shear Torque, Tension Torque
Thermal Shock	-55°C to 200°C
Vibration, Fatigue	5-30g Fixed Frequency
Vibration, Variable	5-2000 Hz as Limited by 1 inch DA and 50 inches/s² Velocity; 0-50g (Standard)

TEST CATEGORY	MIL-STD-202	MIL-STD-202
Barometric Pressure (Barometric)	Method 105, All Conditions	Method 105, All Conditions
Mechanical Resistance	Method 105	Method 105
Resistance to Solvents	Method 105	Method 105
Salt Atmosphere	Method 107, All Conditions	Method 107, All Conditions
Salt-Glass, Pin Test	Method 107, Conditions A, B & D	Method 107, Conditions A, B & D
Salt, Fine Leak	Only Method 112B, Condition C	Only Method 112B, Condition C
Solderability	Procedure 10A	Procedure 10A
Soldering Heat	Method 205	Method 205
Temperature Cycling	Method 210, All Conditions	Method 210, All Conditions
Tensile Strength	Method 211, All Conditions	Method 211, All Conditions
Tensile Shock (Load Integrity)	Method 212, All Conditions	Method 212, All Conditions
Acceleration, Sustained (Centrifuge)	Method 213, All Conditions	Method 213, All Conditions
Shock (Mechanical)	Method 214, Conditions D, E & F	Method 214, Conditions D, E & F
Vibration, Fatigue	Method 201	Method 201
Vibration, Variable Frequency	Method 202	Method 202
Power Cycling	Method 203	Method 203
Power Cycling	Method 204	Method 204
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Power Cycling	Method 399	Method 399
Power Cycling	Method 400	Method 400

Life, Power-Age, Environmental and Military Testing Capabilities — USA MIL-S-19500 Qualified

Life Tests and Power-Age Capabilities

- | | |
|---|--|
| <p>A. High temperature storage life testing up to 200°C.</p> <p>B. Voltage temperature stress tests at both ambient and elevated conditions.</p> <p>C. Free air operation life. Test capability, 1000 positions for power transistors, and 1500 positions for power diodes.</p> | <p>D. HTRB test capabilities over 25,000 positions for V_{GS} and for V_{DS} burn-in for HEXFETs, and more than 2000 positions for diodes, SCRs and Schottkys.</p> <p>E. Computerized readout equipment.</p> <p>F. Intermittent operating life tests at various cycles and power levels.</p> |
|---|--|

Environmental Test Capabilities

TEST	CAPABILITY
Acceleration, Sustained Centrifuge	50-30,000g (Standard)
Altitude (Barometric Pressure, Reduced)	450,000 Ft. Simulated Altitude at $T_A = 25^\circ\text{C}$
Moisture Resistance	25-85°C 85% RH
Salt Atmosphere/Spray	25°C to 71°C, up to 20% Salt Solution by Weight
Seal-Gross, Fine Leak	1×10^{-8} atm cc/sec, Fluorocarbons, Mineral Oils, FC-43, Hydrostatic Pressure: 0-100 psig
Symbolization (Resistance to Solvents)	Permanent Marking
Shock (Mechanical)	Pulse Shape — Approximately Half-sine 500-1500g at 0.5-1.0 msec
Solderability	Up to 260°C
Temperature Cycling	- 65°C to 200°C
Terminal Strength (Lead Integrity)	Lead Fatigue, Tension, Stud Torque, Terminal Torque
Thermal Shock	- 65°C to 200°C
Vibration, Fatigue	5-20g Fixed Frequency
Vibration, Variable	5-2000 Hz as Limited by 1 inch DA and 60 inches/second Velocity; 0-20g (Standard)

Military Test Standard Capabilities

TEST CATEGORY	MIL-STD-202	MIL-STD-750
Barometric Pressure (reduced)	Method 105, All Conditions	Method 1001, All Conditions
Moisture Resistance	Method 106	Method 1021
Resistance to Solvents	Method 215	Method 1022
Salt Atmosphere	Method 101, All Conditions	Method 1041, Method 1046
Seal, Gross Leak	Method 112B, Conditions A, B & D	Method 1071, Conditions C, D & F
Seal, Fine Leak	Only Method 112B, Condition C Procedure IIIA	Method 1071, Condition H
Solderability	Method 208	Method 2026
Soldering Heat	Method 210, All Conditions	Method 2031
Temperature Cycling	Method 102, All Conditions	Method 1051, All Conditions
Terminal Strength	Method 211, All Conditions	Method 2036, All Conditions
Terminal Shock (Glass Strain)	Method 107, All Conditions	Method 1056, All Conditions
Acceleration, Sustained (Centrifuge)	Method 212, All Conditions	Method 2006
Shock (Mechanical)	Method 213, Conditions D, E & F	Method 2016
Vibration, Fatigue	Method 201	Method 2046
Vibration, Variable Frequency	Method 204	Method 2056
PIND	—	Method 2052
Power Cycling	—	Method 1042

Life, Power-Age, Environmental and Military Testing Capabilities — Europe

Life Test and Power-Age Capabilities

- A. High temperature storage life testing up to 200°C.
- B. Voltage temperature stress tests at both ambient and elevated conditions.
- C. HTRB test capabilities over 5000 positions for V_{GS} and for V_{DS} burn-in for HEXFETs.
- D. Computerized measurement and readout equipment.
- E. Intermittent operating life tests at various cycles and power levels.

Environmental Test Capabilities

TEST	
Acceleration, Sustained Centrifuge	50 to 30,000g (Standard)
Altitude (Barometric Pressure Reduced)	450,000 Ft. Simulated Altitude at $T_A = 25^\circ\text{C}$
Moisture Resistance	25°C to 85°C, 85% Relative Humidity
Seal-Gross, Fine Leak	1×10^{-8} atm cc/sec, Fluorocarbons, Mineral Oils, FC-43, Hydrostatic Pressure: 0 to 100 psig
Symbolisation (Resistance to Solvents)	Permanent Marking
Solderability	Up to 250°C
Temperature Cycling	-65°C to 200°C
Terminal Strength (Lead Integrity)	Lead Fatigue, Tension, Stud Torque; Terminal Torque
Thermal Shock	-85°C to 200°C

Military Test Standard Capabilities

TEST CATEGORY	MIL-STD-750 / ESA/SCC	CECC 50,000
Barometric Pressure (reduced)	Method 1001	—
Moisture Resistance	Method 1021	4.4.2
Resistance to Solvents	Method 1022	4.2.3
Seal, Gross Leak	Method 1071, Conditions C, D & F	4.4.10 Qc
Seal, Fine Leak	Method 1071, Condition H	4.4.10 Qc
Solderability	Method 2026	4.4.7
Soldering Heat	Method 2031	4.4.8
Temperature Cycling	Method 1051, All Conditions	4.4.4 Na
Terminal Strength	Method 2036, All Conditions	4.4.9, All Conditions
Terminal Shock (Glass Strain)	Method 1056, All Conditions	4.4.9, All Conditions
Acceleration, Sustained (Centrifuge)	Method 2006	4.4.11
PIND	Method 2052	—
Power Cycling	Method 1042	—

HEXFET, Mil-Qualified

TO39/HEXFET/N-Channel

Part Numbers			Hexfet Cross Reference	Voltage	Current $T_c = 25^\circ\text{C}$ (A)	MIL-S-19500	Qualification	Case Outline Number (2)	Case Style
JEDEC	JANTX	JANTXV							
2N6782	JANTX2N6782	JANTXV2N6782	IRFF110	100V	3.5	/556	19500-1262-83	H13	TO-205AF TO-39
2N6784	JANTX2N6784	JANTXV2N6784	IRFF210	200V	2.25	/556	19500-1262-83		
2N6786	JANTX2N6786	JANTXV2N6786	IRFF310	400V	1.25	/556	19500-1262-83		
2N6788	JANTX2N6788	JANTXV2N6788	IRFF120	100V	6.0	/555	19500-1263-83		
2N6790	JANTX2N6790	JANTXV2N6790	IRFF220	200V	3.5	/555	19500-1263-83		
2N6792	JANTX2N6792	JANTXV2N6792	IRFF320	400V	2.0	/555	19500-1263-83		
2N6794	JANTX2N6794	JANTXV2N6794	IRFF420	500V	1.5	/555	19500-1263-83		
2N6796	JANTX2N6796	JANTXV2N6796	IRFF130	100V	8.0	/557	19500-1263-83		
2N6798	JANTX2N6798	JANTXV2N6798	IRFF230	200V	5.5	/557	19500-1261-83		
2N6800	JANTX2N6800	JANTXV2N6800	IRFF330	400V	3.0	/557	19500-1261-83		
2N6802	JANTX2N6802	JANTXV2N6802	IRFF430	500V	2.5	/557	19500-1261-83		



TO39/HEXFET/P-Channel

2N6845	JANTX2N6845	JANTXV2N6845	IRFF9120	-100V	-4.0	/563	19500-1094-86		
2N6847	JANTX2N6847	JANTXV2N6847	IRFF9220	-200V	-2.5	/563	19500-1094-86		
2N6849	JANTX2N6849	JANTXV2N6849	IRFF9130	-100V	-6.5	/564	19500-1093-86		
2N6851	JANTX2N6851	JANTXV2N6851	IRFF9230	-200V	-4.0	/564	19500-1093-86		

TO3/HEXFET/N-Channel

2N6756	JANTX2N6756	JANTXV2N6756	IRF130	100V	14.0	/542	19500-488-81	H17	TO-204AA TO-3
2N6758	JANTX2N6758	JANTXV2N6758	IRF230	200V	9.0	/542	19500-488-81		
2N6760	JANTX2N6760	JANTXV2N6760	IRF330	400V	5.5	/542	19500-488-81		
2N6762	JANTX2N6762	JANTXV2N6762	IRF430	500V	4.5	/542	19500-489-81	H18 (3)	
2N6764	JANTX2N6764	JANTXV2N6764	IRF150	100V	38.0	/543	19500-490-81		
2N6766	JANTX2N6766	JANTXV2N6766	IRF250	200V	30.0	/543	19500-490-81		
2N6768	JANTX2N6768	JANTXV2N6768	IRF350	400V	14.0	/543	19500-960-82	H17	
2N6770	JANTX2N6770	JANTXV2N6770	IRF450	500V	12.0	/543	19500-960-82		

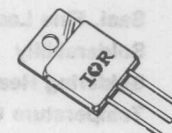


TO3/HEXFET/P-Channel

2N6804	JANTX2N6804	JANTXV2N6804	IRF9130	-100V	-12.0	/562	19500-811-86		
2N6806	JANTX2N6806	JANTXV2N6806	IRF9230	-200V	-6.5	/562	19500-811-86		

TO254/HEXFET/N-Channel

2N7218	JANTX2N7218	JANTXV2N7218	IRFM140	100V	28.0	/596	19500-703-91	H19	TO-254AA M-PAK (1)
2N7219	JANTX2N7219	JANTXV2N7219	IRFM240	200V	18.0	/596	19500-703-91		
2N7221	JANTX2N7221	JANTXV2N7221	IRFM340	400V	10.0	/596	19500-703-91		
2N7222	JANTX2N7222	JANTXV2N7222	IRFM440	500V	8.0	/596	19500-703-91		
2N7224	JANTX2N7224	JANTXV2N7224	IRFM150	100V	34.0	/592	19500-703-91		
2N7225	JANTX2N7225	JANTXV2N7225	IRFM250	200V	27.4	/592	19500-703-91		
2N7227	JANTX2N7227	JANTXV2N7227	IRFM350	400V	14.0	/592	19500-703-91		
2N7228	JANTX2N7228	JANTXV2N7228	IRFM450	500V	12.0	/592	19500-705-91		



TO254/HEXFET/P-Channel

2N7236	JANTX2N7236	JANTXV2N7236	IRFM9140	-100V	-18.0	/595	19500-503-91		
2N7237	JANTX2N7237	JANTXV2N7237	IRFM9240	-200V	-11.0	/595	19500-503-91		



(1) PACKAGES CONTAINING BERYLLIA SHALL NOT BE GROUND, SANDBLASTED, MACHINED, OR HAVE OTHER OPERATIONS PERFORMED ON THEM WHICH WILL PRODUCE BERYLLIA OR BERYLLIUM DUST. FURTHERMORE, BERYLLIUM OXIDE PACKAGES SHALL NOT BE PLACED IN ACIDS THAT WILL PRODUCE FUMES CONTAINING BERYLLIUM.

(2) FOR CASE OUTLINE DRAWING SEE PAGE 157, 158.

(3) TO-204AE CASE STYLE, SEE PAGE 158.

Schottky Diodes — MIL-Qualified


D04 & D05/Schottky

Part Numbers				Voltage (V)	Industrial Current Rating (A)	Military Current Rating (A)	MIL-S-19500	Qualification	(1) Outline Number	Case Style
JEDEC	JAN	JANTX	JANTXV							
1N6391	JAN1N6391	JANTX1N6391	JANTXV1N6391	45	25	25	/553	19500-647-83	J12	D04 
1N6392	JAN1N6392	JANTX1N6392	JANTXV1N6392	45	60	60	/554	19500-648-83	J13	D05 

(1) FOR CASE OUTLINE DRAWING SEE PAGE 161.

HEXFET, CECC Qualified — Europe


T03/HEXFET/N-Channel

Basic Type	V _{DS} (V)	R _{DS(on)} (Ohms)	CECC Specification	Issue No.	Issue Date	Level of Quality Assessment and CECC 50 000 Screen Level Options	Notes	Case Outline
IRF044	60	0.028	50 012-056	1	6/91	E-,EA,EB,EC,ED	(1)	TO-204AA TO-3 
IRF120	100	0.30	50 012-012	2	6/83	E-,EA,EB,EC,ED		
IRF130	100	0.18	50 012-013	2	6/83	E-,EA,EB,EC,ED		
IRF140	100	0.077	50 012-056	1	6/91	E-,EA,EB,EC,ED	(1)	
IRF150	100	0.055	50 012-014	2	6/83	E-,EA,EB,EC,ED		
IRF220	200	0.80	50 012-102	2	6/83	E-,EA,EB,EC,ED		
IRF230	200	0.40	50 012-013	2	6/83	E-,EA,EB,EC,ED		
IRF240	200	0.18	50 012-056	1	6/91	E-,EA,EB,EC,ED	(1)	
IRF250	200	0.085	50 012-014	2	6/83	E-,EA,EB,EC,ED	(1)	
IRF330	400	1.00	50 012-013	2	6/83	E-,EA,EB,EC,ED		
IRF340	400	0.40	50 012-013	1	6/91	E-,EA,EB,EC,ED		
IRF350	400	0.30	50 012-014	2	6/83	E-,EA,EB,EC,ED		
IRF430	500	1.50	50 012-012	2	6/83	E-,EA,EB,EC,ED		
IRF440	500	0.85	50 012-056	1	6/91	E-,EA,EB,EC,ED		
IRF450	500	0.40	50 012-014	2	6/83	E-,EA,EB,EC,ED		

T03/HEXFET/P-Channel

IRF9130	-100	0.30	50 012-015	2	6/83	E-,EA,EB,EC,ED		
IRF9140	-100	0.20	50 012-057	1	6/83	E-,EA,EB,EC,ED		
IRF9230	-200	0.80	50 012-015	1	1/91	E-,EA,EB,EC,ED		
IRF9240	-200	0.50	50 012-057	1	6/83	E-,EA,EB,EC,ED		

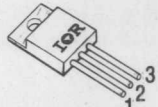
T039/HEXFET/N-Channel

2N6782	100	0.60	50 012-027	1	3/85	E-,EA,EB,EC,ED		TO-205AF TO-39 
2N6788	100	0.30	50 012-028			E-,EA,EB,EC,ED		
2N6796	100	0.18	50 012-029			E-,EA,EB,EC,ED		
2N6790	200	0.80	50 012-028			E-,EA,EB,EC,ED		
2N6798	200	0.40	50 012-029			E-,EA,EB,EC,ED		
2N6800	400	1.00	50 012-029			E-,EA,EB,EC,ED		

T039/HEXFET/P-Channel

2N6845	-100	0.60	50 012-036	1	6/91	E-,EA,EB,EC,ED		
2N6849	-100	0.30	50 012-037			E-,EA,EB,EC,ED		
2N6847	-200	1.50	50 012-036			E-,EA,EB,EC,ED		
2N6851	-200	0.80	50 012-037			E-,EA,EB,EC,ED		

T0257/HEXFET/N-Channel

IRFY044(M)	60	0.03	50 012-062	1	10/91	E-,EA,EB,EC,ED	(3) (4)	TO-257AA Y-PAK 
IRFY120(M)	100	0.31	50 012-060			E-,EA,EB,EC,ED		
IRFY130(M)	100	0.19	50 012-061			E-,EA,EB,EC,ED		
IRFY140(M)	100	0.092	50 012-062			E-,EA,EB,EC,ED		
IRFY240(M)	200	0.19	50 012-062			E-,EA,EB,EC,ED		
IRFY340(M)	400	0.55	50 012-062			E-,EA,EB,EC,ED		
IRFY430(M)	500	1.50	50 012-061			E-,EA,EB,EC,ED		
IRFY440(M)	500	0.85	50 012-062			E-,EA,EB,EC,ED		

T0257/HEXFET/P-Channel

IRFY9120(M)	-100	0.60	50 012-063	1	10/91	E-,EA,EB,EC,ED	(3) (4)				
IRFY9130(M)	-100	0.31	50 012-064			E-,EA,EB,EC,ED					
IRFY9140(M)	-100	0.21	50 012-065			E-,EA,EB,EC,ED					
IRFY9240(M)	-200	0.50	50 012-065			E-,EA,EB,EC,ED					

	1	2	3
IRFY	G	D	S
IRFY(M)	D	S	G

(1) OUTLINE TO TO-204AE (MODIFIED) — CASE STYLE H18.



(2) A MINIMUM QUANTITY OF 100 IS REQUIRED ON THE "M" VARIANT ITEM.

(3) M-SUFFIX IDENTIFIES ALTERNATIVE PINOUT ARRANGEMENT D/S/G INSTEAD OF STANDARD ARRANGEMENT G/D/S.

(4) FOR CASE OUTLINE DRAWING SEE PAGE 157, 158.

Thyristors, CECC Qualified — Europe



Thyristor 10-50 Amps

Basic Type	Voltage (V)	Current (A)	CECC Specification	Issue No.	Issue Date	Level of Quality Assessment and CECC 50 000 Screen Level Options	Notes	Outline
10RIA10 10RIA20 10RIA40 10RIA60 10RIA80 10RIA100 10RIA120	100 200 400 600 800 1000 1200	10	50 011-008	2	5/82	F,L	(1)	TO-208AA (TO-48) Case Outline No. T1
16RIA10 16RIA20 16RIA40 16RIA60 16RIA80 16RIA100 16RIA120	100 200 400 600 800 1000 1200	16	50 011-008	2	5/82	F,L		
22RIA10 22RIA20 22RIA40 22RIA60 22RIA80 22RIA100 22RIA120	100 200 400 600 800 1000 1200	22	50 011-008	2	5/82	F,L		
25RIA10 25RIA20 25RIA40 25RIA60 25RIA80 25RIA100 25RIA120	100 200 400 600 800 1000 1200	25	50 011-008	2	5/82	F,L		
50RIA10 50RIA20 50RIA40 50RIA60 50RIA80 50RIA100 50RIA120	100 200 400 600 800 1000 1200	50	50 011-008	2	12/86	F,L		TO-208AC (TO-65) Case Outline No. T3 

(1) FOR CASE OUTLINE DRAWING SEE PAGE 173.

Rectifiers, CECC Qualified — Europe


Rectifiers 6-70 Amps

Basic Type	Voltage (V)	Current (A)	CECC Specification	Issue No.	Issue Date	Level of Quality Assessment and CECC 50 000 Screen Level Options	Notes	Outline
6F(R)10 6F(R)20 6F(R)40 6F(R)60 6F(R)80 6F(R)100 6F(R)120	100 200 400 600 800 1000 1200	6	50 009-37	2	6/91	F, FA, FB, FC, FD, L, LA, LB, LC, LD	(2)	DO-203AA (DO-4) Case Outline No. R6
12F(R)10 12F(R)20 12F(R)40 12F(R)60 12F(R)80 12F(R)100 12F(R)120	100 200 400 600 800 1000 1200	12	50 009-37	2	6/91	F, FA, FB, FC, FD, L, LA, LB, LC, LD		
16F(R)10 16F(R)20 16F(R)40 16F(R)60 16F(R)80 16F(R)100 16F(R)120	100 200 400 600 800 1000 1200	16	50 009-37	2	6/91	F, FA, FB, FC, FD, L, LA, LB, LC, LD		
40HF(R)10 40HF(R)20 40HF(R)40 40HF(R)60 40HF(R)80 40HF(R)100 40HF(R)120 40HF(R)140 40HF(R)160	100 200 400 600 800 1000 1200 1400 1600	40	50 009-38	2	6/91	F, FA, FB, FC, FD, L, LA, LB, LC, LD		DO-203AB (DO-5) Case Outline No. R7A
70HF(R)10 70HF(R)20 70HF(R)40 70HF(R)60 70HF(R)80 70HF(R)100 70HF(R)120 70HF(R)140 70HF(R)160	100 200 400 600 800 1000 1200 1400 1600	70	50 009-27	2	6/91	F, FA, FB, FC, FD, L, LA, LB, LC, LD		
85HF(R)10 85HF(R)20 85HF(R)40 85HF(R)60 85HF(R)80 85HF(R)100 85HF(R)120	100 200 400 600 800 1000 1200	85	50 009-040	2	6/91	F, FA, FB, FC, FD, L, LA, LB, LC, LD		

(2) FOR CASE STYLES SEE PAGE 169.


HEXFET, ESA/SCC — Qualified — Europe

TO3/HEXFET/N-Channel

Basic Type	V _{DS} (V)	R _{DS(on)} (Ohms)	ESA/SCC Specification	Variant	Test Level	Issue No.	Issue Date	Notes	Outline
2N6764 2N6766 2N6768	100 200 400	0.055 0.085 0.30	5205/013 5205/013 5205/013	-01 -02 -03	B,C B,C B,C	2A	3/85	(1)	TO-204AA (TO-3) Case Outline No. H17 
2N6804 2N6806	-100 -200	0.30 0.80	5206/004 5206/004	-01 -02	B,C B,C	1A 1A	12/85	(1)	

TO3/HEXFET/P-Channel

TO39/HEXFET/N-Channel


2N6796 2N6782 2N6798 IRFF210 2N6800 IRFF310 2N6802	100 100 200 200 400 400 500	0.18 0.60 0.40 1.50 1.00 3.60 1.50	5205/019 5205/014 5205/019 5205/014 5205/019 5205/014 5205/019	-01 -01 -03 - -05 - -07	B,C B,C B,C - B,C - B,C	1A 1A 1A - 1A - 1A	12/85 3/84 12/85 Pending 12/85 Pending 12/85	(1)	TO-205AF (TO-39) Case Outline No. H13 
2N6849 2N6851	-100 -200	0.30 0.80	5206/003 5206/003	-01 -02	B,C B,C	1 1	12/85	(1)	

TO39/HEXFET/P-Channel

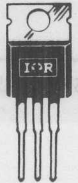
TO ORDER SPECIFY BASIC TYPE, SPECIFICATION, VARIANT, LOT A
E.G. 2N6764, SCC520S/013.018, ISSUE N:2 DATED 3/88.

HEXFET, DEF STAN — 59/61 Part 80 — Tested — Europe

TO220/HEXFET/N-Channel

Basic Type	V _{DS} (V)	R _{DS(on)} (Ohms)	IR Document	Option	Notes	Outline
IRFZ14 IRFZ24 IRFZ34 IRFZ44	60	0.20 0.10 0.05 0.028	- - - -	F,FX	(1)	TO-220AB Case Outline No. H5 
IRF510 IRF520 IRF530 IRF540	100	0.54 0.27 0.16 0.077	E2957 E2958 E2959 E2960			
IRF610 IRF620 IRF630 IRF640	200	1.50 0.80 0.40 0.18	E2957 E2958 E2959 E2960			
IRF614 IRF624 IRF634 IRF644	250	2.00 1.10 0.45 0.28	- - - -			
IRF710 IRF720 IRF730 IRF740	400	3.60 1.80 1.00 0.55	E2957 E2958 E2959 E2960			
IRF820 IRF830 IRF840	500	3.00 1.50 0.85	E2958 E2959 E2960			

TO220/HEXFET/P-Channel

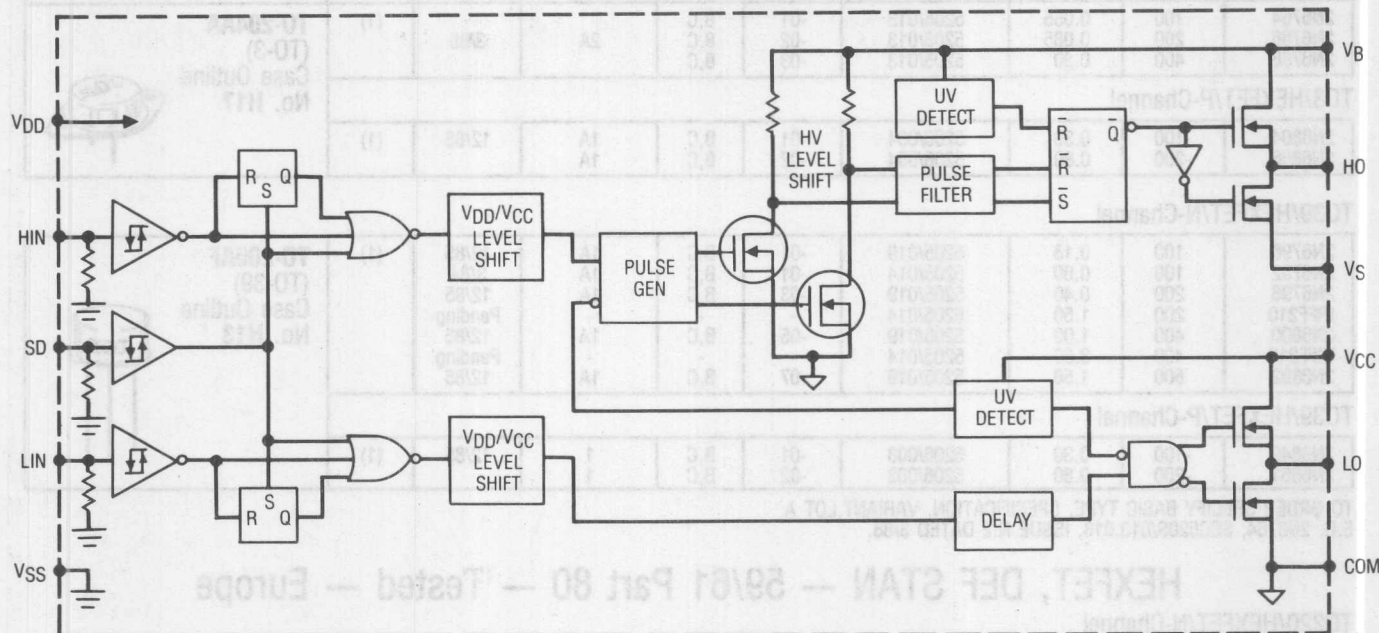
IRF9Z14 IRF9Z24 IRF9Z34	-60	0.50 0.28 0.14	- - -	F,FX	(1)	TO-220AB Case Outline No. H5 
IRF9510 IRF9520 IRF9530 IRF9540	-100	1.20 0.60 0.30 0.20	- E2961 E2962 -			
IRF9610 IRF9620 IRF9630 IRF9640	-200	3.00 1.50 0.80 0.50	- E2961 E2962 -			

(1) FOR CASE OUTLINE DRAWING SEE PAGE 153, 157 AND 158.

PIC — High Reliability Type


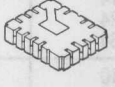
High Voltage MOS Gate Driver

IR2110L/IR2110E



FEATURES


- Drives a pair of HEXFETs or IGBTs
- Two Independent Channel Drivers
 - One Floating High Side Driver
 - One Ground Referenced Low Side Driver
- Operates to 500V
- 2 Amperes Peak Current Drive Capability
- Operates to 500 KHz
- High dv/dt ($> \pm 50V/ns$) Immunity
- CMOS and LSTTL Compatible Schmitt Trigger Inputs
- Low Quiescent Power Dissipation
- Undervoltage Lockout with Hysteresis (both channels)
- 25 ns Typical Switching Time (into 100 pF load)
- Matched Delay Times for Both Channels (within 10 ns)
 - 120 ns Turn-on Delay
 - 94 ns Turn-off Delay
- Cycle by Cycle Edged Triggered Latched Shutdown
- Logic Supply Return Can Swing $\pm 5V$ from Power Ground
- Floating Supply Offset $-5V$ from Power Ground
- Latch Immune CMOS (withstands $> 2A$ reverse current at I/O pins)

Part Number	V _S Offset Supply Voltage (V)	V _{BS} , V _{CC} Output Voltage (V)	I _{OUT} Sink Source (A)	Case Outline No. (2)	Case Style
IR2110L	10-500	10-20	2	P2	14 PIN CERAMIC MO-036AB 
IR2110E	10-500	10-20	2	H22	LCC 

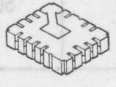
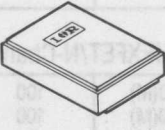
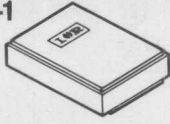
(2) FOR CASE OUTLINE SEE PAGE 157 AND 158.

HEXFET High Reliability

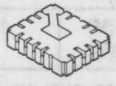
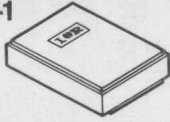
TO39/HEXFET Logic Level/N-Channel

Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Case Outline Number (2)	Notes	Case Style
IRLF110	100	0.60	3.5	14	15	H13		TO-205AF TO-39 
IRLF120		0.35	5.3	21	20			
IRLF130		0.20	8	33	25			

LCC/SMD/HEXFET/N-Channel

IRFE024	60	0.15	7.4	30	14	H22	LCC 
IRFE110	100	0.60	3.1	12	11		
IRFE120	100	0.30	4.8	19	14		
IRFE130	100	0.18	7.4	30	22		
IRFE210	200	1.50	1.8	7.2	11		
IRFE220	200	0.80	2.8	11	14		
IRFE230	200	0.40	4.8	19	22		
IRFE310	400	3.60	1.2	4.8	11		
IRFE320	400	1.80	1.8	7.2	14		
IRFE330	400	1.00	3.0	12	22		
IRFE420	500	3.00	1.4	5.6	14	H21	SMD-1 
IRFE430	500	1.50	2.5	10	22		
IRFN044	60	0.40	34	136	75		
IRFN054	60	0.027	45	180	100		
IRFN140	100	0.10	22	88	75		
IRFN150	100	0.073	27	108	100		
IRFN240	200	0.18	14	56	75		
IRFN250	200	0.10	22	88	100		
IRFN340	400	0.55	8	32	75		
IRFN350	400	0.315	11	44	100		
IRFN440	500	0.89	6	24	75	H21	SMD-1 
IRFN450	500	0.42	10.4	41	100		
IRFNG40	1000	3.50	3	12	75		
IRFNG50	1000	2.00	4.5	18	100		


LCC/SMD/HEXFET/P-Channel

IRFE9024	-60	0.28	-5.4	-22	14	H22	LCC 
IRFE9110	-100	1.20	-2.2	-8.8	11		
IRFE9120	-100	0.60	-3.5	-14	14		
IRFE9130	-100	0.30	-6.5	-25	22		
IRFE9210	-200	3.00	-1.3	-5.2	11		
IRFE9220	-200	1.50	-2.1	-8.4	14		
IRFE9230	-200	0.80	-3.6	-14	22		
IRFN9140	-100	0.20	-17	-68	75	H21	SMD-1 
IRFN9240	-200	0.51	-8	-32	75		

(2) FOR CASE OUTLINE DRAWING SEE PAGE 157, 158.

HEXFET High Reliability

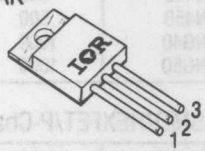
TO66/HEXFET/N-Channel Not For Future Designs

Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Case Outline Number (2)	Notes	Case Style
IRFJ120 IRFJ130 IRFJ140	100	0.3 0.18 0.085	8 12 15	32 40 60	40 50 70	H16		TO-213AA TO-66
IRFJ220 IRFJ230 IRFJ240	200	0.8 0.4 0.18	5 8 13	20 32 52	40 50 70			
IRFJ320 IRFJ330 IRFJ340	400	1.8 1.0 0.55	3 4.5 7.5	12 18 30	40 50 70			
IRFJ420 IRFJ430 IRFJ440	500	3.0 1.5 0.85	2.5 3.8 6	10 15 24	40 50 70			

TO66/HEXFET/P-Channel Not For Future Designs

IRFJ9130 IRFJ9140 IRFJ9230 IRFJ9240	-100 -100 -200 -200	0.31 0.21 0.81 0.51	-8.5 -18.0 -5.5 -8.0	-34 -72 -22 -32	50 70 50 70	H16		TO-213AA TO-66
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TO257/HEXFET/N-Channel

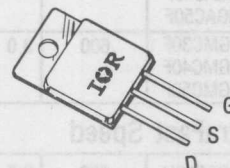
IRFY120(M) IRFY130(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY430(M) IRFY440(M)	100 100 100 200 400 500 500	0.31 0.19 0.092 0.19 0.55 1.50 0.85	7.4 10.8 18.4 12.4 6.9 3.5 5.5	29.2 43.2 73.6 49.6 27.6 14 22	30 45 60 60 60 45 60	H23		TO-257 Y-PAK 
IRFY9120(M) IRFY9130(M)	-100	0.60 0.31	-5.3 -9.3	-21.2 -37.2	30 45			

(2) FOR CASE OUTLINE DRAWING SEE PAGE 157, 159.



HEXFET High Reliability
TO254/HEXFET/N-Channel

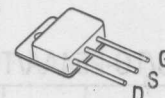
Part Number	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Outline Number (2)	Notes	Case Style
IRFM044	60	0.04	25	210	150	H19		TO-254AA M-PAK (1)
IRFM054	60	0.022	25	150	150			
IRFM140	100	0.100	25	110	150			
IRFM150	100	0.065	25	160	150			
IRFM240	200	0.200	18	72	125			
IRFM250	200	0.100	25	100	150			
IRFM340	400	0.56	8.5	40	125			
IRFM350	400	0.31	15	60	150			
IRFM360	400	0.20	25	100	300			
IRFM440	500	0.86	8	32	125			
IRFM450	500	0.42	13	52	150			
IRFM460	500	0.27	21	84	300			
IRFMG40	1000	3.5	3.9	16	125			


TO254/HEXFET/P-Channel

IRFM9130	-100	0.31	-11.5	-48	75			
IRFM9140	-100	0.21	-17.3	-69	125			
IRFM9230	-200	0.81	-6.5	-26	75			
IRFM9240	-200	0.51	-10.7	-43	125			

TO-258/HEXFET/N-Channel

IRFV360	400	0.21	22	80	250	H20		TO-258
IRFV460	500	0.27	21	70				


MO036/HEXFET/N-Channel

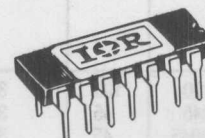
IRFG110	100	0.8	0.95	4	1.4	H15		MO-036AB
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MO036/HEXFET/P-Channel

IRFG9110	-100	1.4	-0.75	-3	1.4
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MO036/HEXFET/N & P Channel

IRFG5110	100	0.8	1	4	1.4
	-100	0.8	-0.95	-4	
IRFG6110	100	0.8	0.95	4	
	-100	1.4	-0.95	-3.5	





(1) PACKAGES CONTAINING BERYLLIA SHALL NOT BE GROUND, SANDBLASTED, MACHINED, OR HAVE OTHER OPERATIONS PERFORMED ON THEM WHICH WILL PRODUCE BERYLLIA OR BERYLLIUM DUST. FURTHERMORE, BERYLLIUM OXIDE PACKAGES SHALL NOT BE PLACED IN ACIDS THAT WILL PRODUCE FUMES CONTAINING BERYLLIUM.

(2) FOR CASE OUTLINE DRAWING SEE PAGE 157, 158.



T03/T0-254/T0-258

Part Number	BV _{CES} Collector to Emitter Breakdown Voltage (V)	V _{GE(th)} Gate to Emitter Threshold Voltage		V _{CE(on)} Collector to Emitter Saturation Voltage (V)	I _C Continuous Collector Current		E _{ts} typ Total Switching Loss @ T _J = 150°C V _{CC} = 480V		P _D Max. Power Dissip. (W)	Case Outline Number (4)	Notes	Case Style
		Min (V)	Max (V)		@ T _C = 25°C (A)	@ T _C = 100°C (A)	(mJ)	(A)				

Fast Speed

IRGAC30F	600	3.0	5.5	2.1	23	12	2.5	17	75	IG5	—	T0-3	
IRGAC40F				2.0	35	20	4.4	27	125		(1)	T0-204AE	
IRGAC50F				1.7	35	30	6.0	39	150		(1)		
IRGMC30F	600	3.0	5.5	2.1	23	12	2.5	17	75	IG6	—	T0-254	
IRGMC40F				2.0	35	20	4.4	27	125		(1) (2)		
IRGMC50F				1.7	35	30	6.0	39	150		(1) (2)		

UltraFast Speed

IRGAC30U	600	3.0	5.5	3.0	17	8	0.59	12	75	IG5	—	T0-3	
IRGAC40U				3.0	31	15	1.5	20	125		—	T0-204AE	
IRGAC50U				3.0	35	20	1.7	27	150		(1)		
IRGMC30U	600	3.0	5.5	3.0	17	8	0.59	12	75	IG6	—	T0-254	
IRGMC40U				3.0	31	15	1.5	20	125		—		
IRGMC50U				3.0	35	20	1.7	27	150		(1) (2)		

UltraFast Speed

IRGMVC50U	600	3.0	5.5	3.0	45		1.7	27	200	IG7	(2) (3)	T0-258	
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Schottky Diodes — High Reliability

LCC/T0-254AA/T0-258/SMD-1

Part Number	V _{RRM} (V)	I _{F(AV)} @ T _C = 100°C Per Package	V _{FM/leg} @ T _C = 125°C (V)	@ I _{FM}	I _{FSM} Single Pulse 10 ms Sine	I _{RM} @ T _J = 125°C & Rated V _{RWM} (mA)	Max. T _J (°C)	Case Outline Number (4)	Note	Case Style
5EQ100	100	25	1.31	50	180	15	150	H22	—	LCC
8EQ045	45	32	1.38	64	180	15	150		—	
22GQ100	100	35*	1.38	70	300	45	150	H19	—	T0-254AA
25GQ045	45	35*	1.30	70	300	45	150		—	M-PAK (2)
22CGQ045	45	35*	0.91	35	300	20	150		(5)	
15CGQ100	100	35*	0.96	35	300	45	150		—	
12CGQ150	150				300	20	150		(5)	
45CKQ100	100	45*	0.96	45	540	45	150	H20	(5)	T0-258
60CKQ045	45	45*	0.83	45	540	45	150		(5)	
15CLQ100	100	40	1.01	40	180	45	150	H21	(5)	SMD-1
20CLQ045	45	80	1.16	80	180	20	150		(5)	

(1) CURRENT IS PACKAGE LIMITED.

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(3) DIODE SPEC'S TBD.

(4) FOR CASE OUTLINE DRAWING SEE PAGE 158.

(5) DUAL-DIE COMMON CATHODE CONFIGURATION.

Thyristors, JEDEC

50 TO 70 Amps

Part Number	Voltage	Military Current Rating (A)	Industrial Current Rating (A)	I _T (AV) @ T _C		I _{TSM} (1)		R _{thJC} DC (°C/W)	Case Outline Number (2)	Case Style
				(A)	(°C)	50 Hz (A)	60 Hz (A)			
2N1792	50	50	70	70	65	955	1000	0.40	T7A	TO-209AC TO-94
2N1793	100	50	70							
2N1795	200	50	70							
2N1797	300	50	70							
2N1798	400	50	70							
2N1799	500	50	70							
2N1800	600	50	70							
2N1805	500	50	70	70	62	955	1000	0.40	T5A	
2N1806	600	50	70							
2N1910	50	50	70							
2N1911	100	50	70							
2N1913	200	50	70							
2N1915	300	50	70							
2N1916	400	50	70							
2N2024	50	70	70	70	85	955	1000	0.40		
2N2025	100	70	70							
2N2027	200	70	70							
2N2029	300	70	70							
2N2030	400	70	70							
2N3091	600	70	70	70	62	955	1000	0.40	T5A	
2N3093	800	70	70							
2N3095	1000	70	70							
2N3097	1200	70	70							

Rectifiers, JEDEC

Rectifiers 150 Amps

Part Number	Voltage	Military Current Rating (A)	Industrial Current Rating (A)	I _F (AV) @ T _C		I _{FSM} (1)		R _{thJC} DC (°C/W)	Case Outline Number (2)	Case Style
				(A)	(°C)	50 Hz (A)	60 Hz (A)			
1N3289	200	150	150	100	130	2200	2300	0.4	R8A (2)	DO-205AA DO-8
1N3291	400	150	150							
1N3293	600	150	150							
1N3294	800	150	150							
1N3295	1000	150	150							
1N3289R	200	150	150							
1N3291R	400	150	150							
1N3293R	600	150	150							
1N3294R	800	150	150							
1N3295R	1000	150	150							

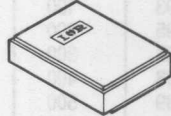
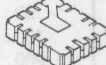


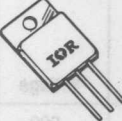

Rectifiers

1N3164	200	300	240	300	120	5970	6265	0.15	R13A (2)	DO-205AB DO-9
1N3168	400	300	275							
1N3170	600	300	275							
1N3172	800	300	275							
1N3174	1000	300	275							
1N3175	1200	300	275							
1N3164R	200	300	240							
1N3168R	400	300	275							
1N3170R	600	300	275							
1N3172R	800	300	275							
1N3174R	1000	300	275							
1N3175R	1200	300	275							

 (1) T_j = T_j max, 100% V_{RM} REAPPLIED

(2) FOR CASE OUTLINE DRAWING SEE PAGE 170, 173, 174

Radiation Hard HEXFETs

Part Number	Radiation Test Level KRad (Si)	V _{DS} Drain Source Voltage (Volts)	R _{DS(on)} On-State Resistance (Ohms)	I _D Continuous Drain Current 25°C Case (Amps)	I _{DM} Pulse Drain Current (Amps)	P _D Max Power Dissipation (Watts)	Case Outline Number (2)	Notes	Case Style
IRHN7054	100	60	0.027	45	180	100	H21		SMD-1  WT. 2.4g
IRHN7150	100	100	0.065	27	108	100			
IRHN7250	100	200	0.11	22	88	100			
IRHN7450	100	500	0.45	10.4	41	100			
IRHN8054	1000	60	0.027	45	180	100			
IRHN8150	1000	100	0.065	27	108	100			
IRHN8250	1000	200	0.11	22	88	100			
IRHN8450	1000	500	0.45	10.4	41	100			
IRHE7110	100	100	0.6	3.5	14	15	H22		LCC  WT. 0.42g
IRHE7130	100	100	0.18	8	32	25			
IRHE7230	100	200	0.44	5	20	25			
IRHE8110	1000	100	0.6	3.5	14	15			
IRHE8130	1000	100	0.18	8	32	25			
IRHE8230	1000	200	0.44	5	20	25			
IRHG7110	100	100	0.80	0.95	4	1.4	H15		MO-036AB  WT. 1.3g
IRHF7110	100	100	0.6	3.5	14	15	H13		TO-205AF TO-39  WT. 0.98g
IRHF7130	100	100	0.18	8	32	25			
IRHF7230	100	200	0.44	5	20	25			
IRHF8110	1000	100	0.6	3.5	14	15			
IRHF8130	1000	100	0.18	8	32	25			
IRHF8230	1000	200	0.44	5	20	25			
IRHM7054	100	60	0.027	35	220	150	H19		TO-254AA (1) 
IRHM7130	100	100	0.18	14	56	75			
IRHM7150	100	100	0.065	34	136	150			
IRHM7230	100	200	0.40	9.0	36	75			
IRHM7250	100	200	0.100	27.4	110	150			
IRHM7360	100	400	0.20	25	100	300			
IRHM7450	100	500	0.42	12	48	150			
IRHM8054	1000	60	0.027	35	220	150			
IRHM8130	1000	100	0.18	14	56	75			
IRHM8150	1000	100	0.065	34	136	150			
IRHM8230	1000	200	0.40	9.0	36	75			
IRHM8250	1000	200	0.100	27.4	110	150			
IRHM8360	1000	400	0.20	25	100	300			
IRHM8450	1000	500	0.42	12	48	150			
IRH7054	100	60	0.027	35	220	150	H18		
IRH7130	100	100	0.18	14	56	75			
IRH7150	100	100	0.065	34	136	150			
IRH7230	100	200	0.40	9.0	36	75			
IRH7250	100	200	0.100	27.4	110	150			
IRH7360	100	400	0.20	25	100	300			
IRH7450	100	500	0.42	12	48	150		(3)	
IRH8054	1000	60	0.027	35	220	150			 WT. 11.5g
IRH8130	1000	100	0.18	14	56	75			
IRH8150	1000	100	0.065	34	136	150			
IRH8230	1000	200	0.40	9.0	36	75			
IRH8250	1000	200	0.100	27.4	110	150			
IRH8360	1000	400	0.20	25	100	300			
IRH8450	1000	500	0.42	12	48	150		(3)	

- DEMONSTRATES EXCELLENT THRESHOLD VOLTAGE STABILITY AND BREAKDOWN VOLTAGE STABILITY AT TOTAL RADIATION DOSES AS HIGH AS 1 MEGARAD.
- CAPABLE OF SURVIVING TRANSIENT IONIZATION PULSES AS HIGH AS 1×10^{12} RADS (SI)/SEC.
- VIRTUALLY IMMUNE TO SEU.

(1) PACKAGES CONTAINING BERYLLIA SHALL NOT BE GROUND, SANDBLASTED, MACHINED, OR OTHER OPERATIONS PERFORMED ON THEM WHICH WILL PRODUCE BERYLLIA OR BERYLLIUM DUST. FURTHERMORE, BERYLLIUM OXIDE PACKAGES SHALL NOT BE PLACED IN ACIDS THAT WILL PRODUCE FUMES CONTAINING BERYLLIUM.

(2) FOR CASE OUTLINE DRAWING SEE PAGE 157, 158.

(3) FOR CASE OUTLINE DRAWING SEE PAGE 158, H17.

High-Rel Element Qualification Certification Procedure for HEXFET and Schottky Die

Mil-S-19500H and Mil-Std 883C are general specifications that are used to define the general and detailed requirements for purchasing semiconductor chips destined for the manufacturing of military/high reliability applications which require lot qualification tests. Mil-S-19500H enables the semiconductor die of

products listed in the Qualified Products List to be qualified to JANC. It is strongly recommended that JANC qualification be adhered to when it is applicable. Mil-Std 883C element qualification procedure should be used only in those cases where there is no QPL product listed for the specific die required.

Mil-Std 883C Method 5008/Die Element Qualification Process Flow

Test Description	Test Method	Chips	Lot Acceptance Test Sample	
<u>Wafer and Die Tests</u>				
Electrical Probe Test @ 25°C	DC Electricals	100%		
Visual Inspection	Mil-Std 750 Method 2069	100%		
SEM		On Customer Request		
<u>Packaged Die Tests</u>			Level B	Level S
Stabilization Bake	Mil-Std 750 Method 2069		X	X
Temperature Cycling	Mil-Std 750 Method 1051		X	
Constant Acceleration	Mil-Std 750 Method 2006		X	
Interim Electrical and Delta parameters			X	
HTRB	Mil-Std 750 HEXFETs — Method 1042 Condition B Diodes — Method 1038 Condition A		X	
Post Burn-in Electrical				
Power Burn-in	Mil-Std 750 HEXFETs — Method 1042 Condition A Diodes — Method 1038 Condition B		X	
End-Point Electrical and Delta Parameters			X	X
Wirebond Pull	Mil-Std 750 Method 2037		X	X
SEM	Mil-Std 750 Method 2077			X
Radiation (Total Dose)	Mil-Std 750 Method 1019		On Customer Request	

(1) Sample die will be assembled using standard International Rectifier packages and construction methodologies which are in full compliance with Mil-S-19500 and Mil-Std-750 manufacturing methods.

Mil-S-19500H/Die Element Qualification Process Flow

Test Description	Test Method	Chips	Lot Acceptance Test Sample
<u>Wafer and Die Tests</u>			
Electrical Probe Test @ 25°C	DC Electricals	100%	
Visual Inspection	Mil-Std 750 Method 2069	100%	
SEM		On Customer Request	
<u>Packaged Die Tests</u>			
Die Selection	See note (2)		
Static/Dynamic Electricals @ 25°C	Mil-S-19500 Group A Subgroups 2, 3, 4		100%
HTRB	Mil-Std 750 HEXFETs — Method 1042 Condition B Diodes — Method 1038 Condition A		100%
Interim Electrical and Delta Parameters			100%
Power Burn-in	Mil-Std 750 HEXFETs — Method 1042 Condition A Diodes — Method 1038 Condition B		100%
End Point Electrical and Delta Parameters			100%
Wire Bond Pull	Mil-Std-750 Method 2037		5
Die Shear	Mil-Std-750 Method 2017		5

(2) Die Sampling Procedure

Avg. Electrical Good Die/Wafer

Over 2500
1000-2499
100-999
2-99

Minimum Sample Size C = 1

77
25
10
5

For greater than 2500 per wafer, QCI must be performed on each wafer.

Lot acceptance test samples will be constructed per following reference table.
Die Reference Table.

Die Size	Voltage Range	Package Type
[HEXFETs]		
HEX-1	100-500	TO-39
HEX-2	100-500	TO-39
HEX-3	100-500	TO-39
HEX-4	100-500	TO-254
HEX-5	100-500	TO-254
[Schottky]		
200 Square	45	DO-5
125 Square	45	DO-4

All die that complete this qualification will be considered JANC qualified product.

Standard and Custom Assemblies

Standard Assemblies

**International
IOR Rectifier**

International Rectifier offers a range of single-phase and three-phase rectifier assemblies from 50 to 1500 amperes and from 400 to 1200 volts. These assemblies offer a convenient cost effective solution to bridge rectifier requirements. Also available are single-phase

and three-phase half controlled bridges, AC phase control switches and AC contactors, zero crossing switch assemblies. Firing control circuits available as option by adding FC to the end of the part number.

SINGLE-PHASE FULL WAVE RECTIFIER ASSEMBLIES(1)

Part Number	(2) I _O (Amps) Absolute Maximum		(3) I _{FSM} (Amps) Peak Surge
	NC	FA	
CB50G2AA4-12	50	70	500
CB65A12AA4-12	+ 65	95	1680
CB70H2AA4-12	70	70	500
CB100A18AA4-12	+ 100	160	2115
CB100H2AA4-12	100	120	1200
CB110A18BA4-12	* + (75)	110	1680
CB120K2AA4-12	120	120	1200
CB160A18BA4-12	* + (100)	160	2115
CB200K2AA4-12	200	250	3000
CB250K4AA4-12	250	250	3000
CB300K4AA4-12	300	500	5000
CB600V4AA4-12	600	700	8000

THREE-PHASE FULL WAVE RECTIFIERS ASSEMBLIES(1)

CT50G2AA4-12	50	80	500
CT70A12AA4-12	+ 70	125	1680
CT80H2AA4-12	80	100	500
CT115A18AA4-12	+ 115	210	2115
CT150A18BA4-12	* + (85)	150	1680
CT150K3AA4-12	150	180	1200
CT210A18BA4-12	* + (115)	210	2115
CT300K3AA4-12	300	400	3000
CT400K6AA4-12	400	400	3000
CT500K6AA4-12	500	700	5000
CT700U6AA4-12	700	700	5000
CT1000V6AA4-12	1000	1200	8000
CT1500V6AA6-12	1500	2200	10000

SINGLE-PHASE HALF CONTROLLED DIODE SCR BRIDGE ASSEMBLIES(1)(4)

CBC30A12AA4-12	30	45	625
CBC60A18AA4-12	+ 60	100	1370
CBC100A18BA4-12	* + (60)	100	1370
CBC120K4AA4-12	120	120	1600
CBC125A18BA4-12	* + (70)	125	1870
CBC250V4AA4-12	250	250	4250

THREE-PHASE HALF CONTROLLED DIODE/SCR BRIDGE ASSEMBLIES(1)(4)

Part Number	(2) I _O (Amps) Absolute Maximum		(3) I _{FSM} (Amps) Peak Surge
	NC	FA	
CTC35A12AA4-12	+ 35	65	625
CTC55A12AA4-12	+ 55	100	1370
CTC80A18AA4-12	+ 80	150	1870
CTC125A18BA4-12	* + (75)	125	1370
CTC150A18BA4-12	* + (80)	150	1870
CTC150K6AA4-12	150	180	4200
CTC350V6AA4-12	350	400	4200

SINGLE-PHASE, 2-SCR CONTROLLED SWITCH ASSEMBLY(1)(4)

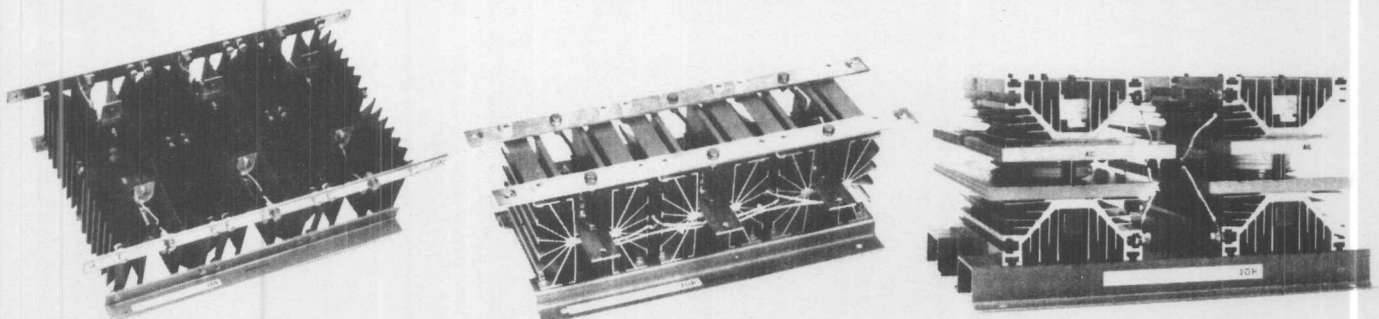
CPA45A12AA4-12	+ 45	75	625
CPA80A12AA4-12	+ 80	125	1370
CPA110A18AA4-12	+ 110	170	1870
CPA120K2AA4-12	120	120	1600
CPA125A18BA4-12	* + (80)	125	1370
CPA170A18BA4-12	* + (110)	170	1870
CPA250V2AA4-12	250	250	4250

THREE-PHASE 2-SCR CONTROLLED SWITCH ASSEMBLY(1)(4)

CPAT30A12AA4-12	+ 30	35	625
CPAT45A12AA4-12	+ 45	65	1370
CPAT100A18BA4-12	* + (55)	100	1370
CPAT120A18BA4-12	* + (70)	120	1870

AC SCR CONTACTOR, 2-SCR ZERO CROSSING SWITCH ASSEMBLY(1) (With Control Circuit)

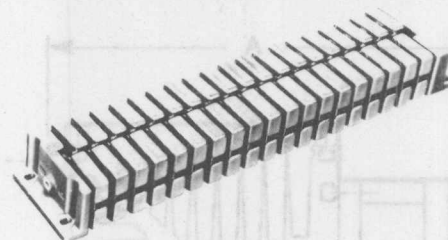
CA120K2AA4-10	120	120	1600
CA250X1AA4-10	250	350	4250
CA300X1AA4-10	300	500	7000



NOTES: + = Isolated Heatsink, ADD-A-pak™ Assembly, * = 115 VAC, 20 VA, 60 Hz, Fan included. (1) V_{RRM} (Volts) = 400-1200 for use on V_{ac(RMS)} = 120-600. (2) Maximum rated output current; NC = Natural convection cooled, 45°C ambient air. FA = Forced air cooled, 500 LFM (min.) 45°C ambient air. (3) Peak 1 cycle (16.7ms) output current surge rating, non repetitive. (4) SCR firing circuits available as option.

HIGH VOLTAGE RECTIFIER COLUMNS: NUMBERING AND RATINGS

1H V8 A 50

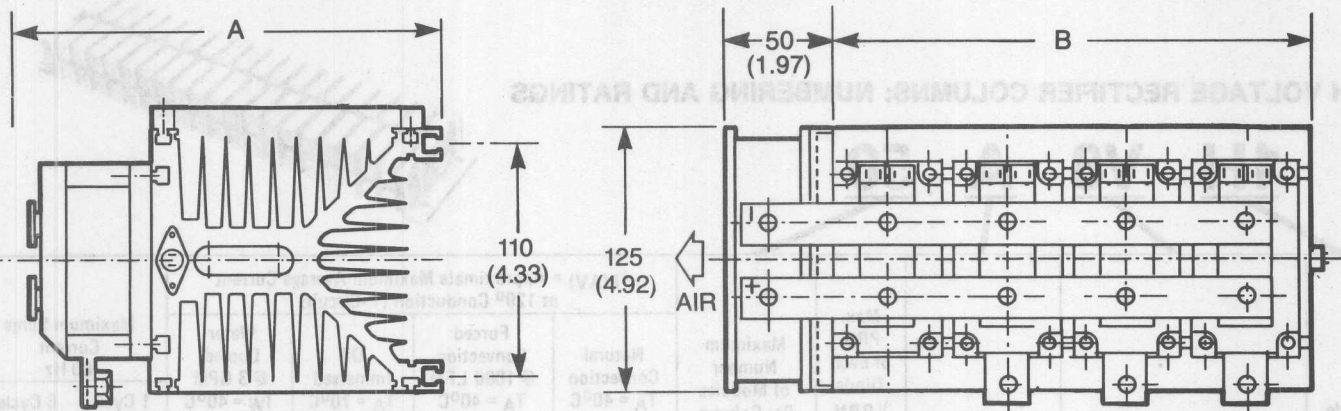


Module Symbol	Type of Circuit	Type of Diode	Max. PRV of Each Diode VRRM (Volts)	Maximum Number of Modules Per Column (DIODES)	IF(AV) = Approximate Maximum Average Current at 120° Conduction (T-Circuit)				Maximum Surge Current 60 Hz	
					Natural Convection TA = 40°C	Forced Convection @ 1000 LFM TA = 40°C	Oil Immersed TA = 70°C	Water Cooled @ 3 GPM TW = 40°C	1 Cycle	6 Cycles
				(Amps)				(Amps)		
1H	Standard Circuits V — Half Wave D — Doubler Q — Quadrupler S — Single Phase Bridge T — Three Phase Bridge	J-60S K-12F-A R-16F	1000 1200 1200	98 (196 Diodes)	2.8 2.8 3.0	5.0 11.0 12.0	5.0 11.0 12.0	N.A. N.A. N.A.	400 280 370	235 150 200
2H	Note: Special circuits can be supplied.	J-60S JJ-2J's (para.) K-12F-A R-16F	1000 1000 1200 1200	(148 Diodes) 74	3.0 3.2 4.0 4.0	5.5 7.0 12.0 12.5	5.5 8.6 12.0 12.5	N.A. N.A. N.A. N.A.	400 800 280 370	235 270 150 200
3H	PEAK REPETITIVE REVERSE VOLTAGE RATING OF EACH DIODE VRRM	L-40HF P-70HF M-85HF	1600 1600 1600	38 (76 Diodes)	7.0 7.0 8.0	17.0 17.0 22.0	33.0 33.0 36.0	N.A. N.A. N.A.	500 1,050 1,500	330 750 1,100
4H		K-12F R-16F L-40HF P-70HF M-85HF	1200 1200 1600 1600 1600	50 (50 Diodes)	12.0 16.0 19.0 20.2 25.8	12.0 16.0 29.5 38.0 45.0	12.0 16.0 31.0 39.7 47.0	N.A. N.A. N.A. N.A. N.A.	280 370 500 1050 1500	150 200 330 750 910
8H		D-10D S-30S J-60S	1000 1000 1000	65 (65 Diodes)	1.5 2.8 3.0	2.0 4.0 5.8	2.5 4.0 5.8	N.A. N.A. N.A.	50 150 400	27 78 235
20H		L-40HF P-70HF M-85HF	1600 1600 1600	34 (68 Diodes)	25.0 25.0 35.0	45.0 55.0 65.0	40.0 40.0 45.0	N.A. N.A. N.A.	500 1,050 1,500	330 750 1,100
21H		N-101KL Q-150K	1600 1200	22 (44 Diodes)	40.0 60.0	80.0 120.0	55.0 85.0	N.A. N.A.	2,500 3,000	1,400 2,350
22H		L-40HF P-70HF M-85HF	1600 1600 1600	17 (34 Diodes)	30.0 30.0 38.0	50.0 60.0 70.0	50.0 50.0 55.0	N.A. N.A. N.A.	500 1,050 1,500	330 750 1,100
		N-101KL Q-150K	1600 1200	11 (22 Diodes)	43.0 65.0	90.0 135.0	70.0 125.0	N.A. N.A.	2,500 3,000	1,400 2,350
23H		U-R23D U-R23D	2500 2500	(20 Diodes) (20 Diodes)	65.0 70.0	145.0 150.0	135.0 170.0	N.A. N.A.	6,800 6,800	4,000 4,000
26H		A-R23A	1600	28	35.0	40.0	95.0	N.A.	6,800	4,000
27H		B-R34B	3000	16	55.0	65.0	160.0	N.A.	15,000	9,000
28H		K-R52K	5000	16	70.0	90.0	270.0	N.A.	28,000	17,000
29H		N-R77R	5000	12	90.0	105.0	350.0	N.A.	63,500	38,000
30H		A-R23A B-R34B K-R52K N-R77R	2600 3000 5000 5000	28 16 16 12	80.0 90.0 95.0 105.0	160.0 225.0 270.0 360.0	185.0 300.0 350.0 470.0	N.A. N.A. N.A. N.A.	6,800 15,000 28,000 63,500	4,000 9,000 17,000 38,000
36H		A-R23A B-R34B K-R52K	2600 3000 5000	15 11 11	N.A. N.A. N.A.	N.A. N.A. N.A.	N.A. N.A. N.A.	400 680 1350	6,800 15,000 28,000	4,000 9,000 17,000
38H	N-R77R	5000	9	N.A.	N.A.	N.A.	2000	63,500	38,000	

Standard and Custom Assemblies

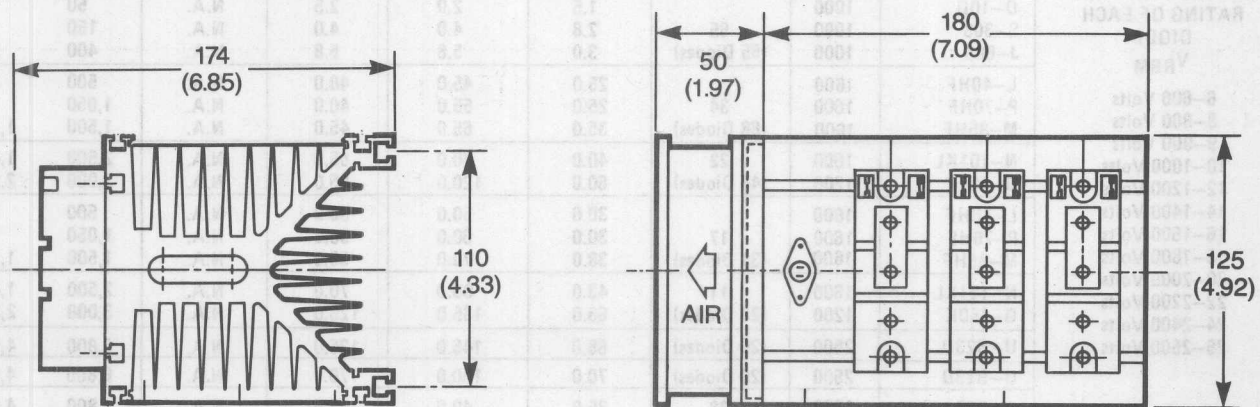
3 ϕ Bridges with Insulated Modules

International
IOR Rectifier



Part Number	Module Used	Natural Cooling	Forced Air Cooling	A	B
CT77T26A18BW4-12	IRKT 26	47 Adc	77 Adc	174	180
CT110T41A18BW4-12	IRKT 41	60 Adc	110 Adc	174	180
CT130T56A18BW4-12	IRKT 56	70 Adc	130 Adc	174	180
CT175T91A18BW4-12	IRKT 91	85 Adc	175 Adc	174	180
CT300T180A18BW4-12	IRKT 180	—	300 Adc	200	220

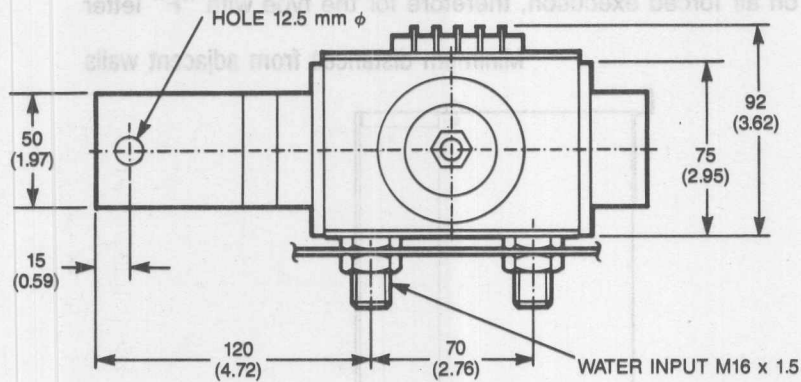
3 ϕ AC Controller with Insulated Modules



Part Number	Module Used	Natural Cooling	Forced Air Cooling
CPA60T26A18BA4-12	IRKT 26	—	60 ARMS
CPA85T41A18BA4-12	IRKT 41	—	85 ARMS
CPA100T56A18BA4-12	IRKT 56	55 ARMS	100 ARMS
CPA135T91A18BA4-12	IRKT 91	65 ARMS	135 ARMS
CPA160T132A18BA4-12	IRKT 132	—	160 ARMS
CPA185T161A18BA4-12	IRKT 161	—	185 ARMS

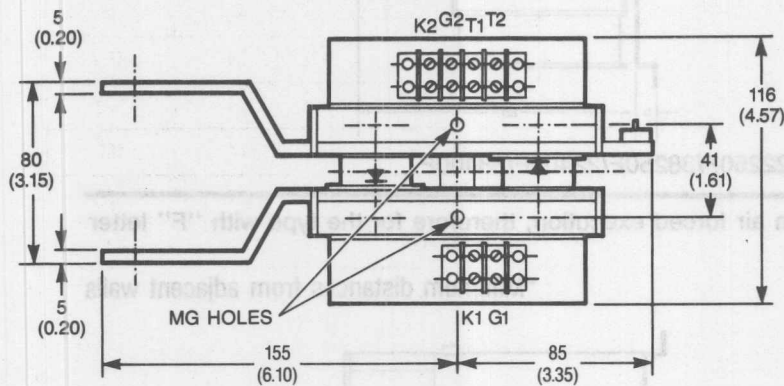
Dimensions in Millimeter and (Inches)

AC Switch Isolated Water Cooled Type A201

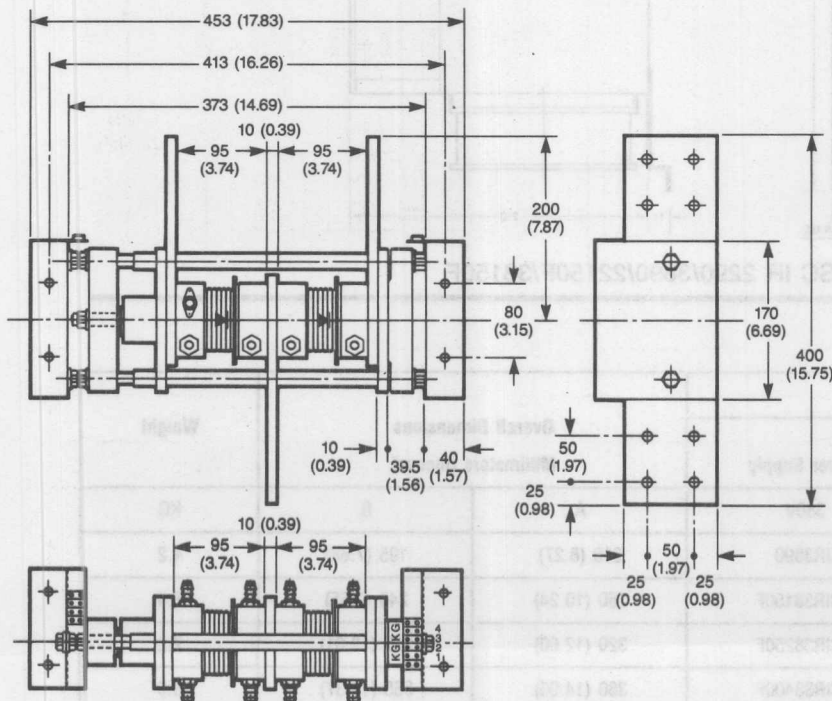


Current rating varies with types of hockey puk used.

Part number A201 (add SCR type)
i.e. A201-S52K12A



AC Controller or 3φ Bridge Water Cooled Type HE161



Part number HE161 (add SCR type)
i.e. HE161-S52K12A.

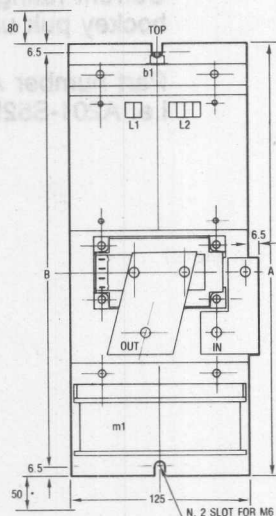
3-UNITS NEEDED FOR 3φ BRIDGE

Standard and Custom Assemblies — Europe

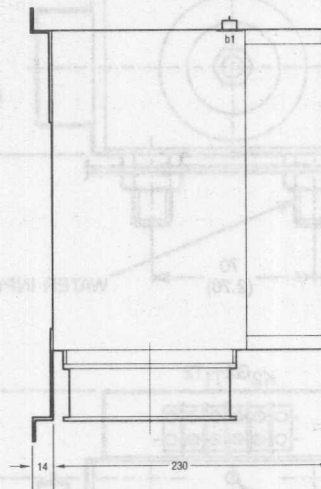
Solid State Contactors

**International
IOR Rectifier**

b1 thermostat and m1 fan are assembled only on air forced execution, therefore for the type with "F" letter in the code. Ex.: SSC IR38400F.

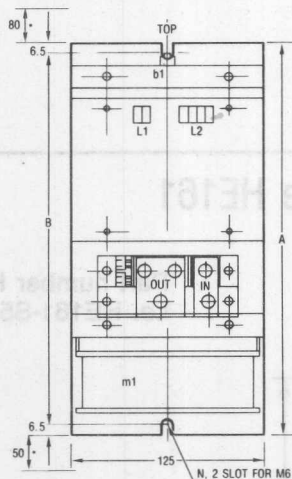


*Minimum distances from adjacent walls

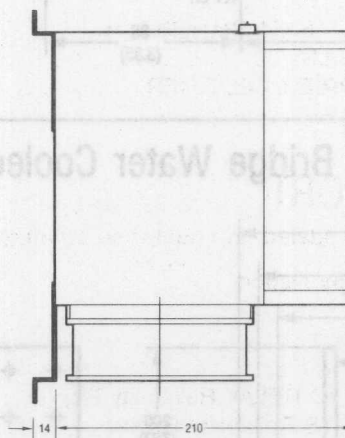


Part No. SSC IR 22250F/38250F/22400F/38400F.

b1 thermostat and m1 fan are assembled only on air forced execution, therefore for the type with "F" letter in the code. Ex.: SSC IR 38150F.



*Minimum distances from adjacent walls



Part No. SSC IR 2290/3890/22150F/38150F.

Solid State Contactors

	Range	Type		Overall Dimensions Millimeters (Inches)		Weight
	Resistive Load	One Phase Standard Voltage	Power Supply			
	A _{max} RMS	220V	380V	A	B	KG
	90	SSCIR2290	SSCIR3890	210 (8.27)	195 (7.68)	4.2
	150	SSCIR22150F	SSCIR38150F	260 (10.24)	245 (9.65)	5.4
	250	SSCIR22250F	SSCIR38250F	320 (12.60)	305 (12.01)	7.2
	400	SSCIR22400F	SSCIR38400F	380 (14.96)	365 (14.37)	8.9

Dimensions in Millimeters and (Inches)

**Order
No.**

DATABOOKS

Databooks feature each respective product and contain data sheets, applicable case style and application notes.

Application Notes and Reliability Data – HEXFET Designer's Manual.....	HDM-1, Vol. 1
DIPs, D-Paks, I-Paks, Logic Level Devices – HEXFET Designer's Manual.....	HDM-1, Vol. 2
Insulated Gate Bipolar Transistors (IGBTs) Designer's Manual.....	IGBT-2
Microelectronic Relays Designer's Manual.....	MPIC-4
Power Interface Products Designer's Manual.....	PIP-90
Power Modules Designer's Manual (Medium and High Power Rectifiers/Thyristors).....	PMD-1
Schottky Diode Designer's Manual.....	SDM-1
Rectifiers, Standard Recovery Type.....	NRPM-2
Rectifiers, Standard Recovery Type – High Power.....	SHVR-1
Rectifiers, Fast Recovery Type.....	FRPM-1
Thyristors, Phase Control Type.....	NTPM-2
Thyristors, Inverter Type.....	IPM-1
Short Form Catalog – Power Semiconductors Product Digest.....	SFC

SELECTION GUIDES

Selection guides feature each respective product series in a matrix covering every part number, rating and applicable case style available from International Rectifier.

BRIDGE RECTIFIER, Encapsulated.....	E1007
DIE—HEXFET, HEXSENSE, Logic Level, Rectifier and Thyristor.....	E1022
HEXFET—POWER MOSFETS.....	E1003
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SURFACE MOUNTED DEVICES.....	E1026

RELIABILITY REPORT

Performance and test results updated and published quarterly.

CUSTOM PRODUCTS Reliability Report	
HEXFET Reliability Report	
IGBT MODULE Reliability Report	
IR2110S Reliability Report	
MICROELECTRONIC POWER IC RELAY Reliability Report	
POWER INTEGRATED CIRCUITS Reliability Report	
PVI1050 PHOTOVOLTAIC ISOLATOR Reliability Report	
SCHOTTKY Reliability Report	
RELIABILITY VIDEO.....	VIDEO
Available for viewing, contact your local IR representative.	

BROCHURES

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Modules

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Thyristors

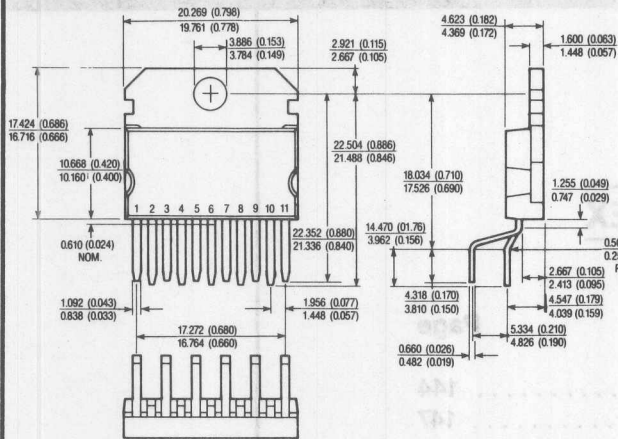
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Heat Exchanger Data Thermal and Heat Transfer Data	AN 701
Silicon Controlled Rectifiers SCRs, Their Parameters, Specifications, Ratings and Characteristics	AN 309
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Die and Case Outlines

DIE AND CASE OUTLINE INDEX

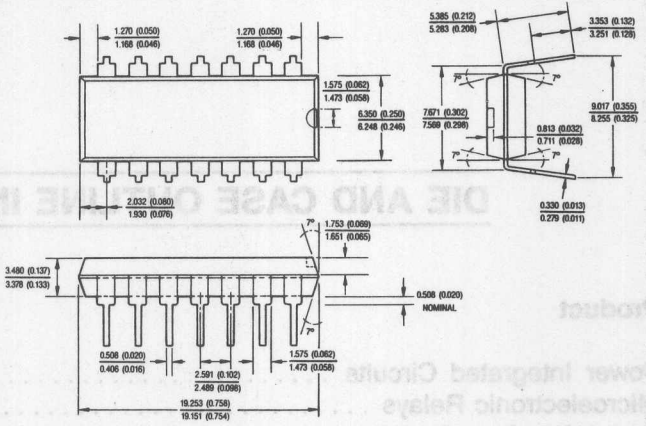
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Die, Rectifier, Thyristor	190

P1



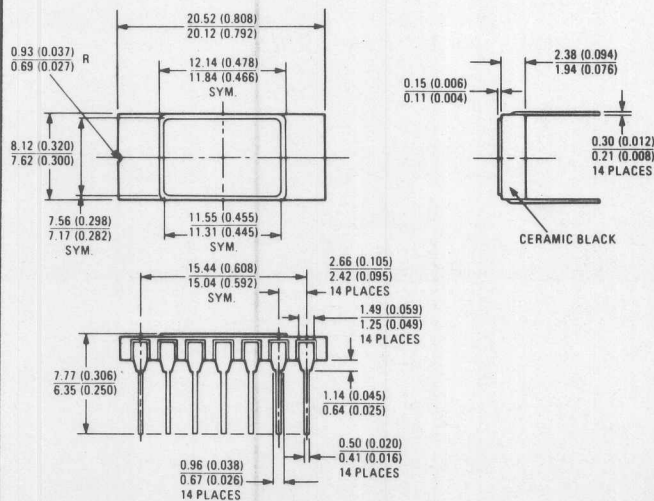
11 Pin SIP Package

P2



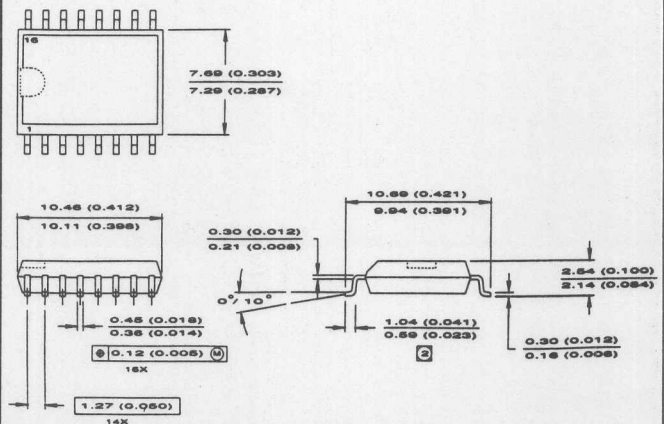
14 Pin Dip Package

P3



14 Pin Dip Package

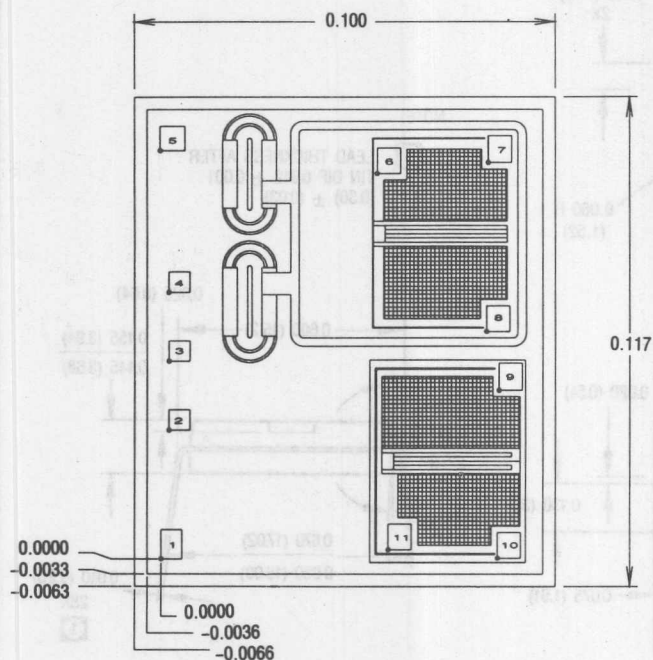
P4



16 Pin Surface Mount Package

Dimensions in Millimeters and (Inches)

P5

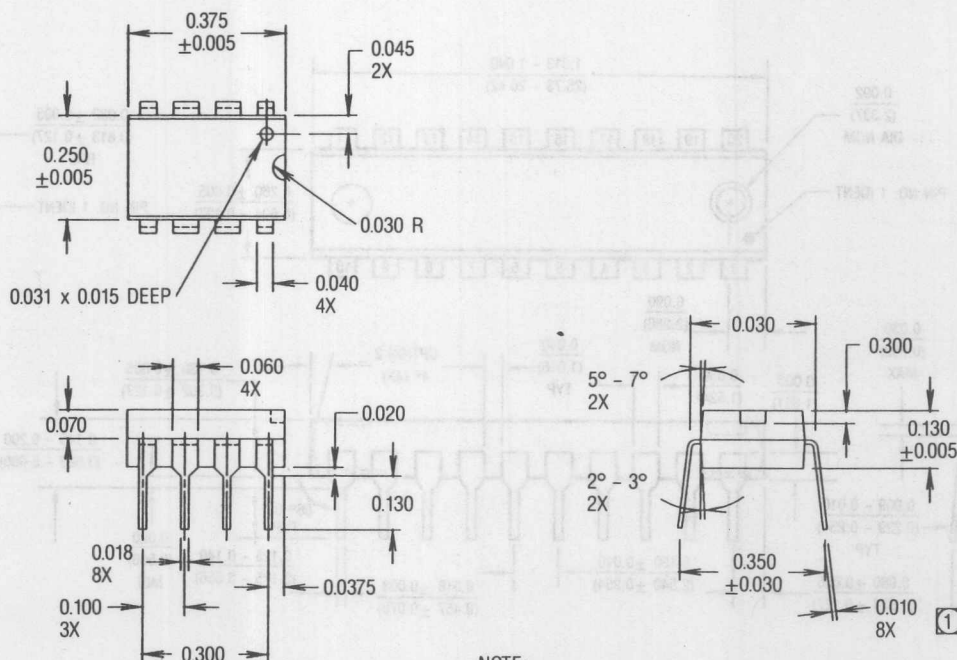


LEGEND

PAD #	FUNCTION	DIMENSIONS H x W	DATUM X Y
1	V _{SS}	.0069 x .0049	.0000, .0000
2	LIN	.0049 x .0049	.0019, .0307
3	SD	.0049 x .0049	.0019, .0471
4	HIN	.0049 x .0049	.0019, .0635
5	V _{DD}	.0059 x .0059	-.0002, .0975
6	HO	.0061 x .0055	.0513, .0920
7	V _B	.0065 x .0055	.0778, .0946
8	V _S	.0061 x .0055	.0774, .0542
9	V _{CC}	.0065 x .0055	.0804, .0402
10	COM	.0061 x .0055	.0800, -.0002
11	LO	.0061 x .0055	.0539, .0022

IR2110 Die (IR2110C)

P6



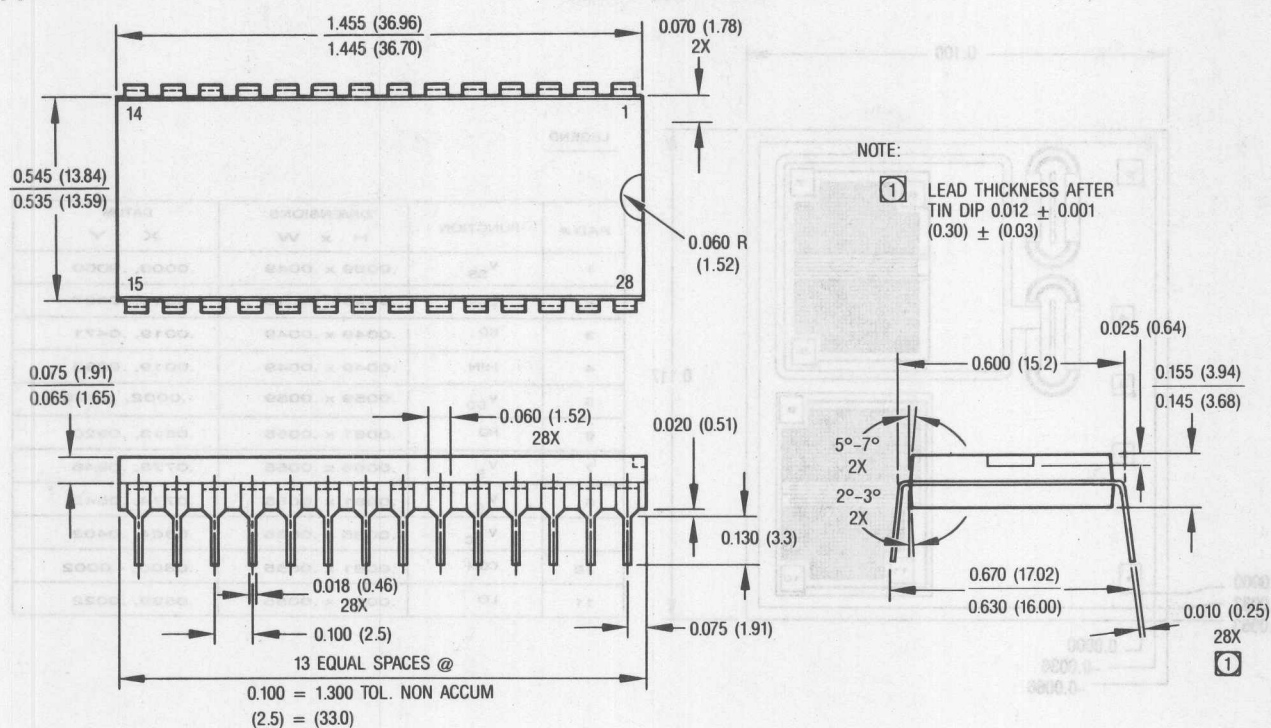
NOTE:

① LEAD THICKNESS AFTER TIN DIP 0.012 ± 0.001

8 Lead DIP Package Outline

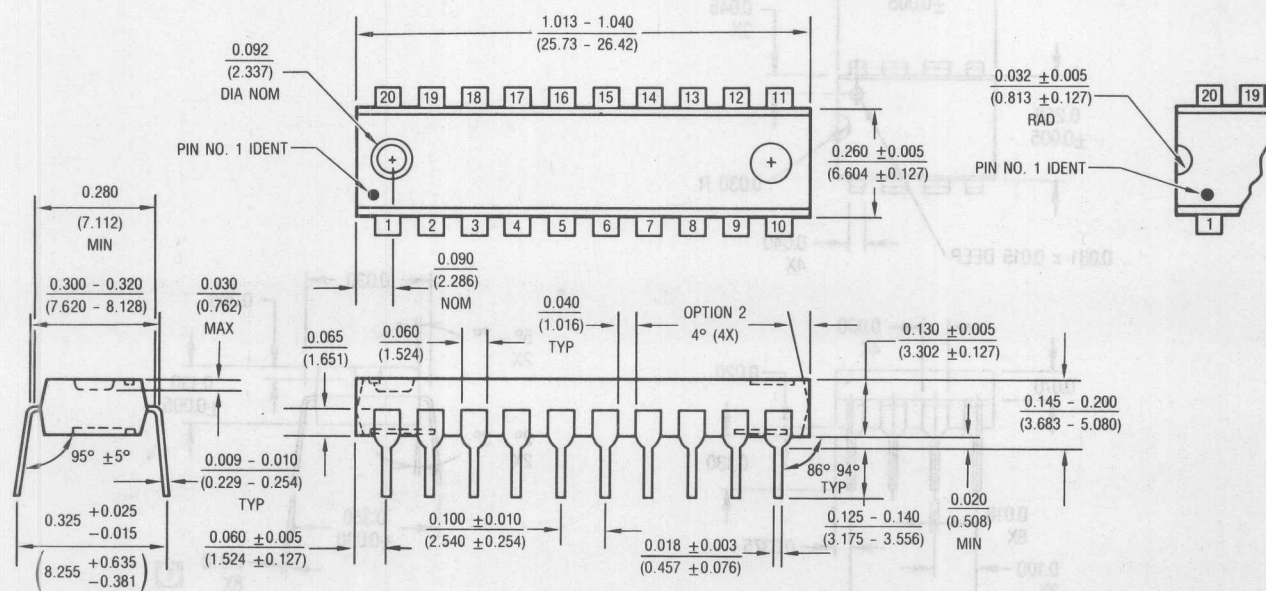
Dimensions in Millimeters and (Inches)

P7



28 Pin Dip Packages

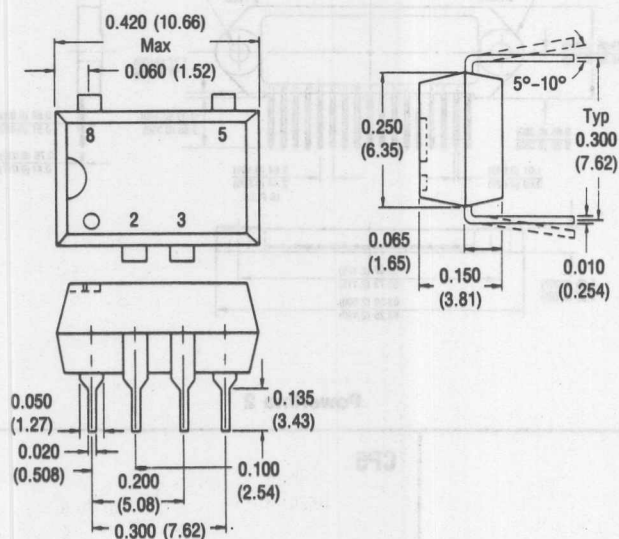
P8



20-Lead Molded DIP Package

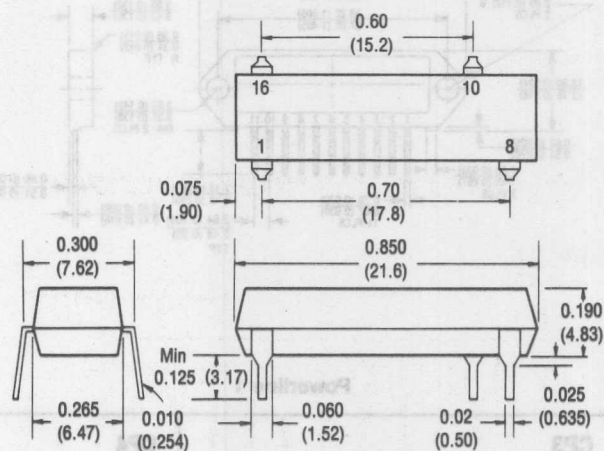
Dimensions in Millimeters and (Inches)

MR1



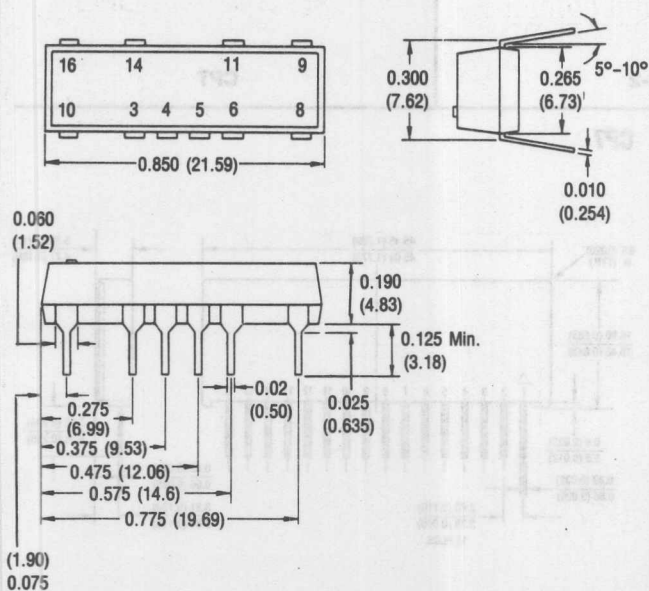
ChipSwitch CS, MOSFET PVD, PVA & PVI Series

MR2



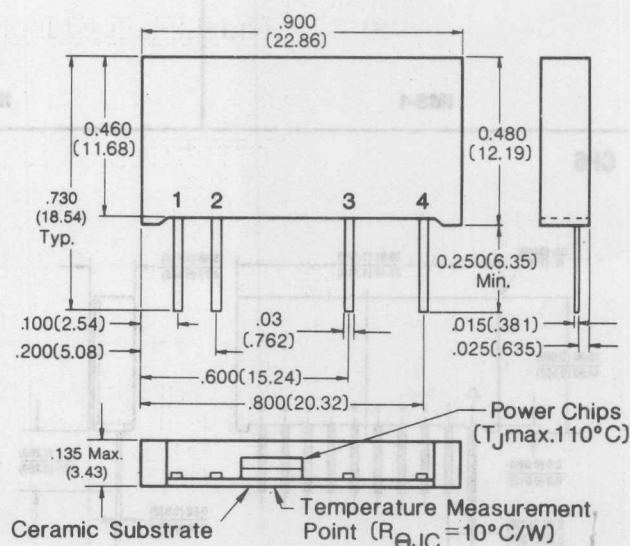
Pinout ChipSwitch DP Series

MR3



BOSFET PVR Series

MR4



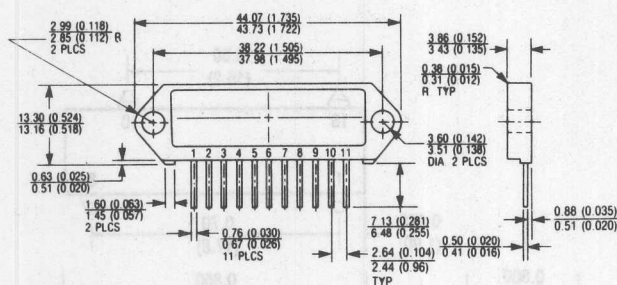
ChipSwitch SP

Power Interface Products

Case Outlines

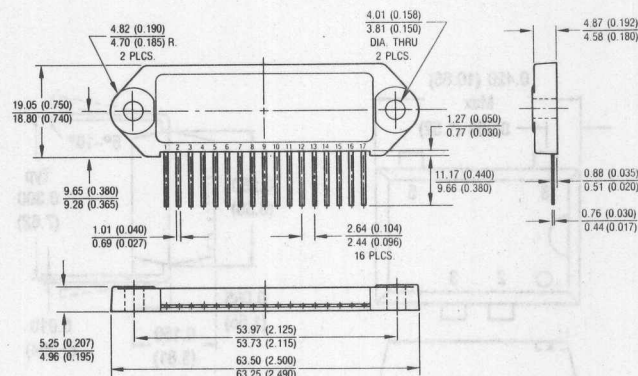
International
Rectifier

CP1



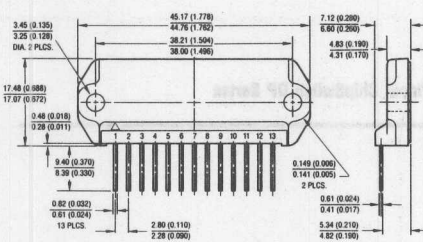
Powerline 1

CP2



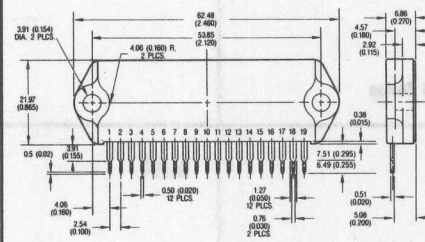
Powerline 2

CP3



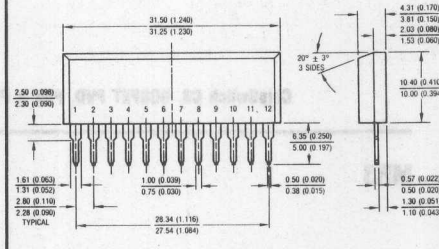
IMS-1

CP4



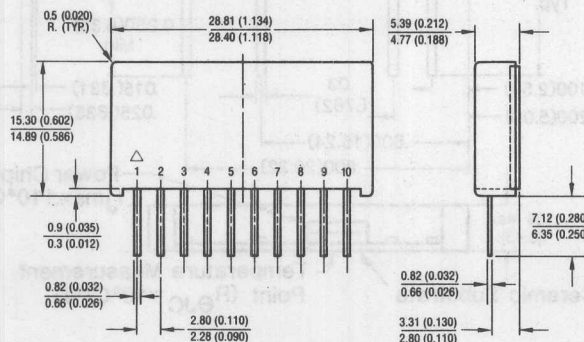
IMS-2

CP5



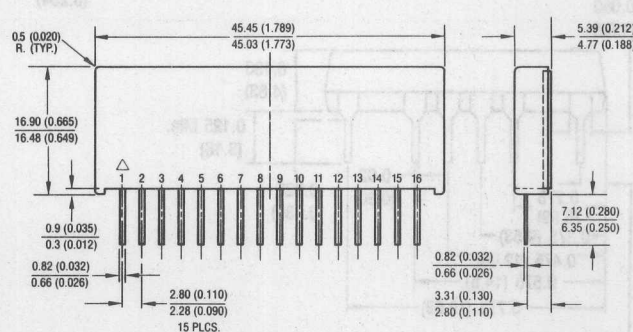
CPT

CP6



SC-1

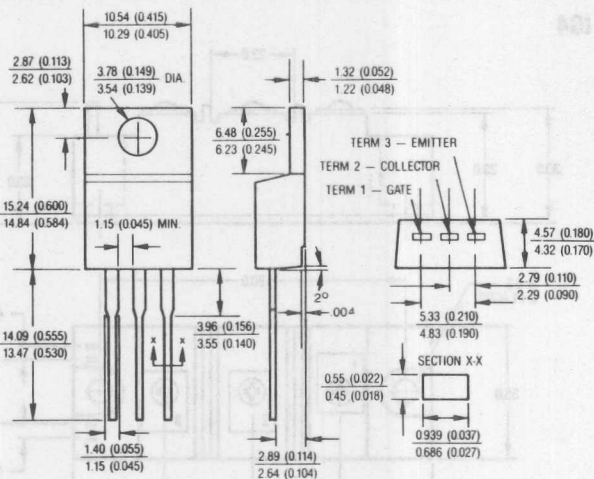
CP7



SC-2

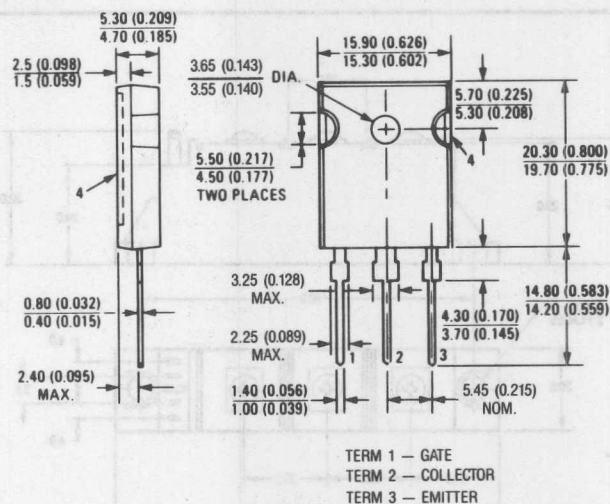
Dimensions in Millimeters and (Inches)

IG1



Case Style TO-220AB

IG2

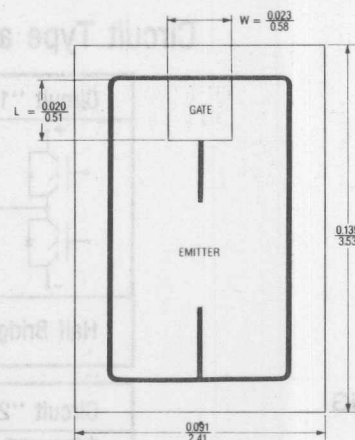


Conforms to JEDEC Outline TO-247AC (TO-3P)

For TO-220 leadform options see page 137.

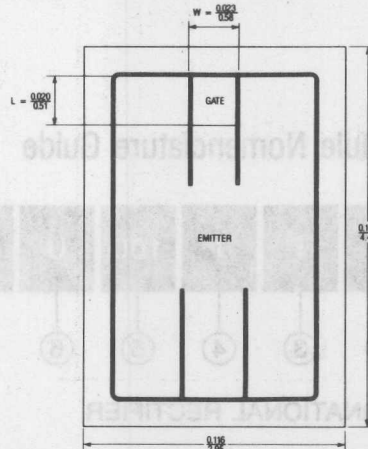
Die Outlines

D49



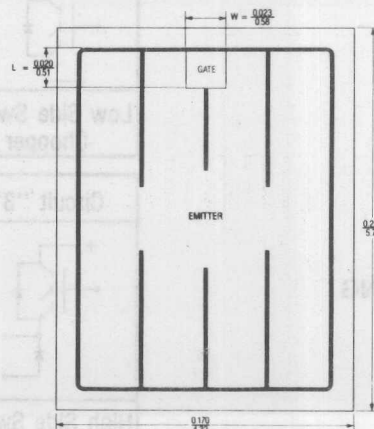
IGBT: HEX-2: 600V

D50



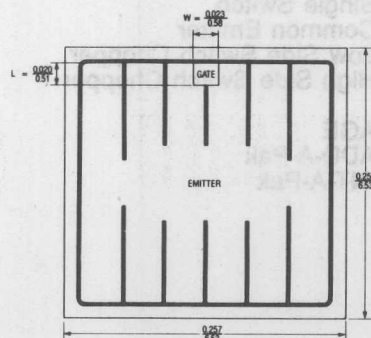
IGBT: HEX-3: 600V

D51



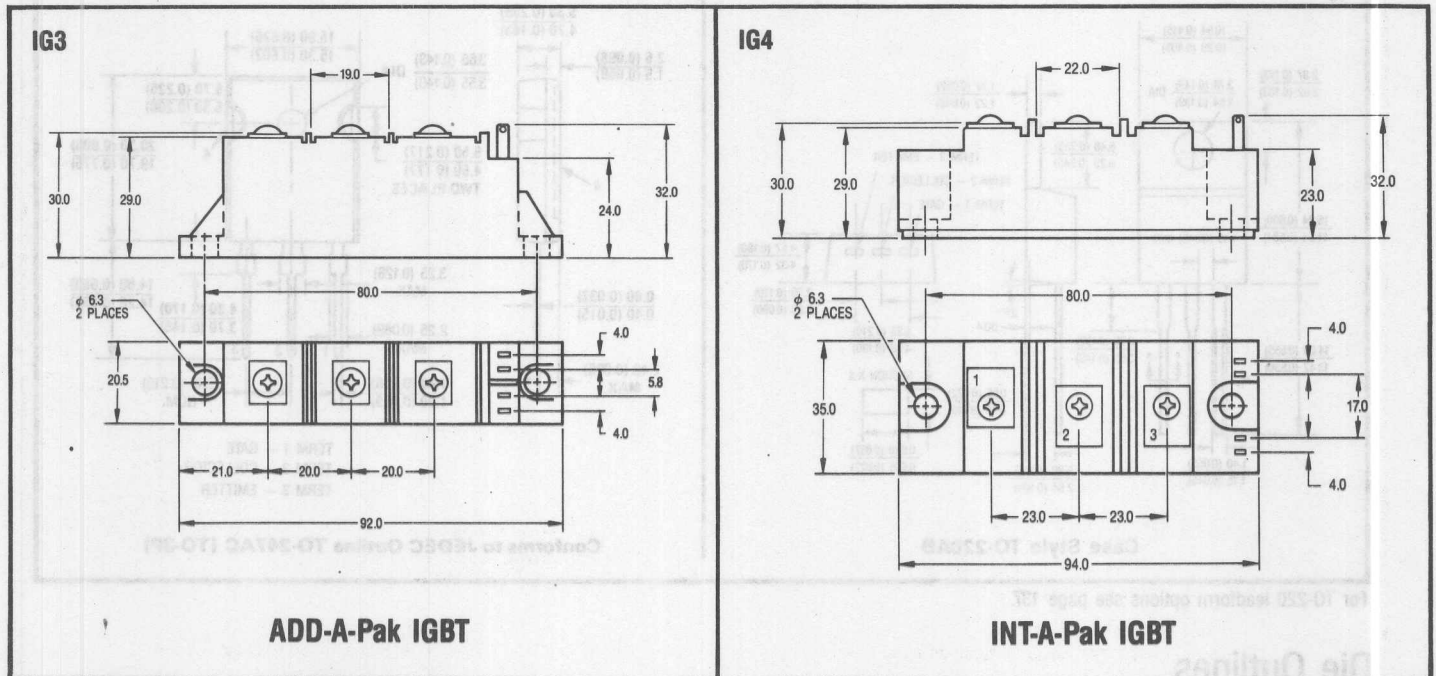
IGBT: HEX-4: 600V

D52



IGBT: HEX-5: 600V

CASE STYLE



DIMENSIONS IN MILLIMETERS

IGBT Module Nomenclature Guide

IR	G	T	I	100	U	06
①	②	③	④	⑤	⑥	⑦

Part Number coding

1 — INTERNATIONAL RECTIFIER

2 — IGBT

3 — FUNCTION

T = Half Bridge
S = Single Switch
C = Common Emitter
K = Low Side Switch Chopper
N = High Side Switch Chopper

4 — PACKAGE

A = ADD-A-Pak
I = INT-A-Pak

5 — CURRENT RATING

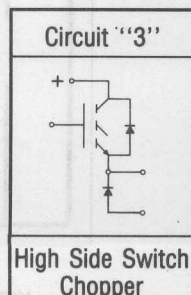
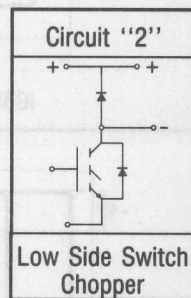
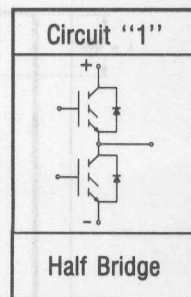
035 = 35A
050 = 50A
065 = 65A
090 = 90A
100 = 100A
115 = 115A
140 = 140A
165 = 165A
200 = 200A

6 — SPEED

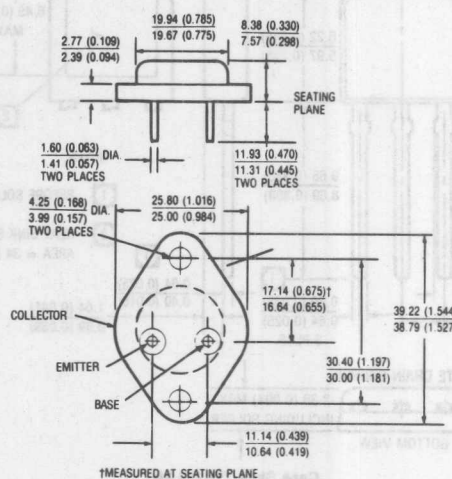
S = Standard
F = Fast
U = UltraFast

7 — VOLTAGE RATING

Circuit Type and Coding

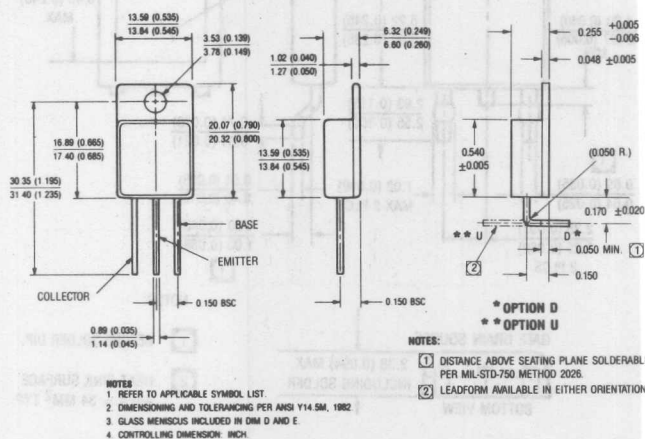


IG5



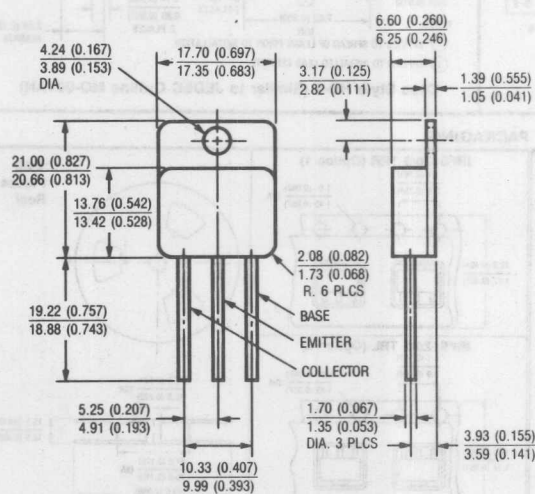
Conforms to JEDEC Outline TO-204AE (Modified TO-3)

IG6

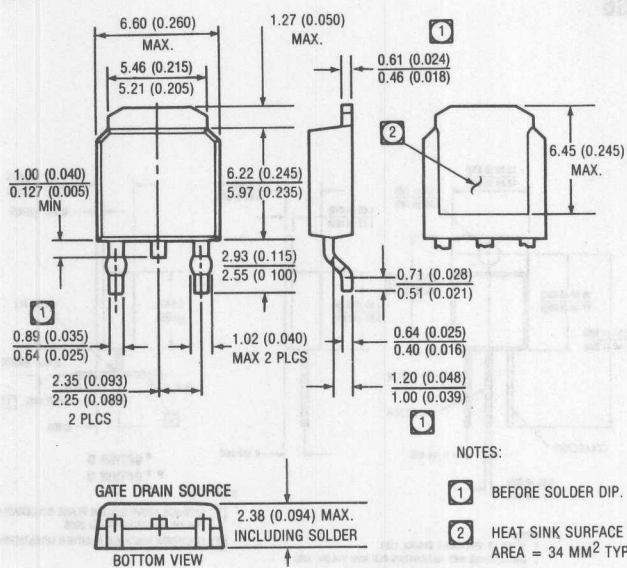
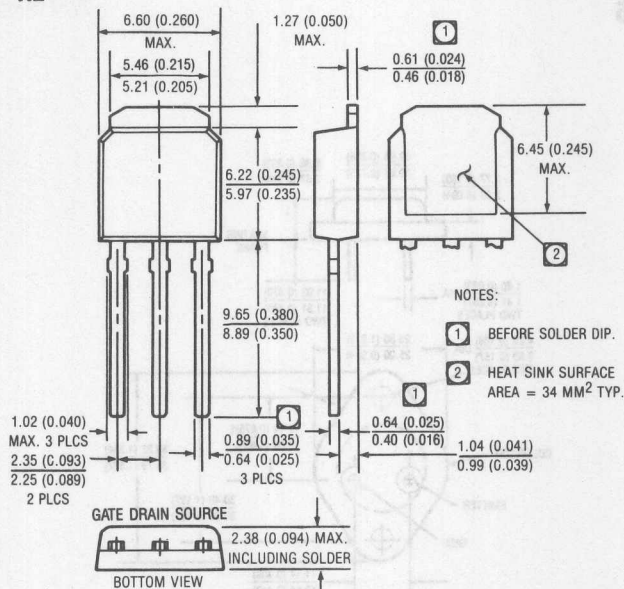
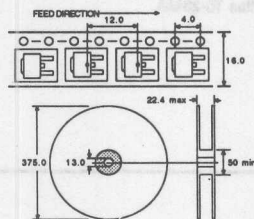


Conforms to JEDEC Outline TO-254AA

IG7



Conforms to JEDEC Outline TO-250

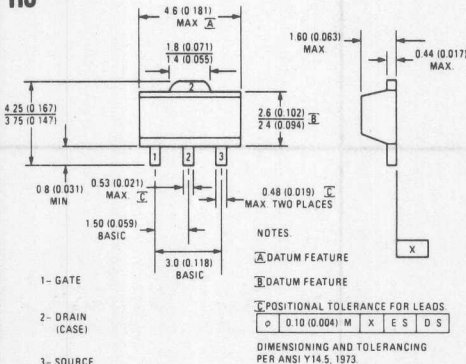
H1

Case Style TO-252AA
H2

Case Style TO-251AA


Ordering Information For: H1 Outline

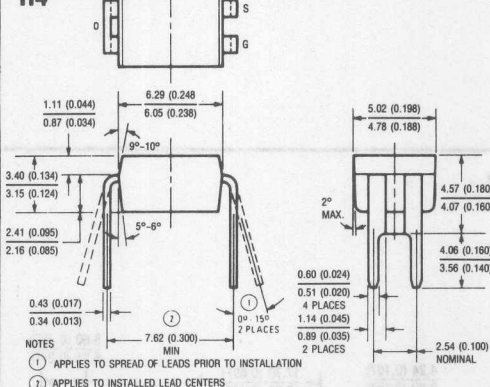
When ordering, indicate the part number, the quantity (in multiples of 2,000 pieces).

Example:

IRFR220TR — 14,000 pieces (for outline H1)

H3


Conforms to JEDEC Outline TO-243AA (SOT-89)

H4


Case Style HD-1 (Similar to JEDEC Outline MO-001AN)

Ordering Information For: H3 Outline

When ordering, indicate the part number, the quantity (in multiples of 1000 pieces, i.e., full reels) and the packaging option.

Example: IRFS1Z0, 15,000 pieces, Option 1

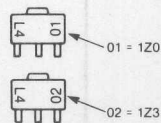
Note: Small quantities for sampling, prototyping etc., will be shipped in cartridges or on 12 mm tape cut to length at the supplier's discretion.

IDENTIFICATION

Marking and Identification

Each device has 4 letters for identification. The 2 letters on the right hand side are used to show voltage, P or N-Channel device, and Fail-out.

Example:

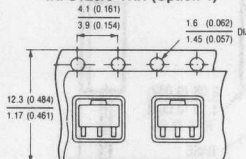


The 2 letters on the left hand side show wafer lot identification.

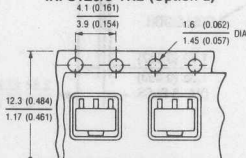
The 2 letters on each side are facing out in both left and right directions. (See example above.)

PACKAGING

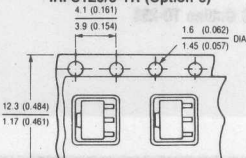
IRFS1Z0/3 TRR (Option 1)



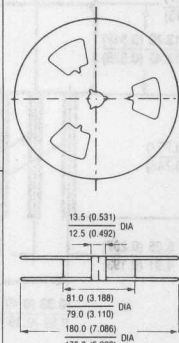
IRFS1Z0/3 TRL (Option 2)



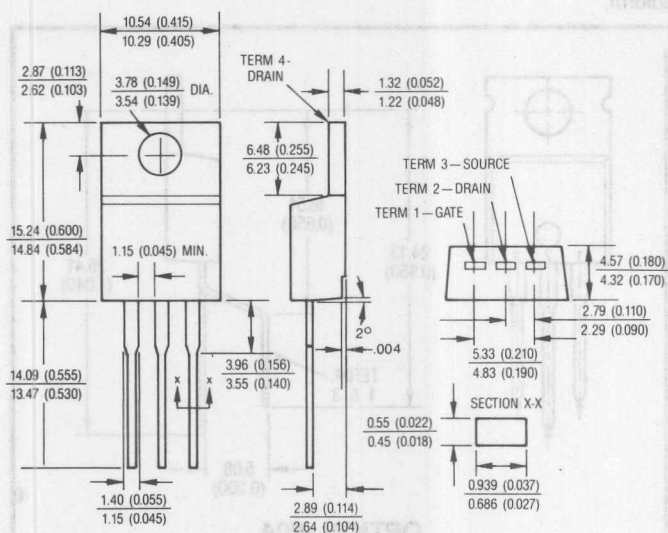
IRFS1Z0/3 TR (Option 3)



1000 Pieces Reel

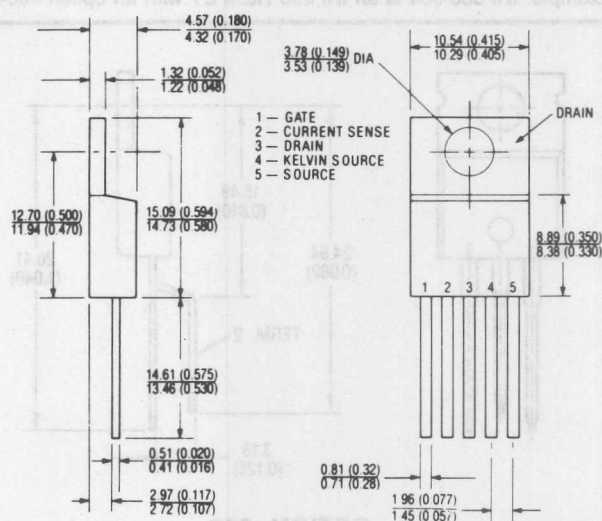


H5



Case Style TO-220AB

H6



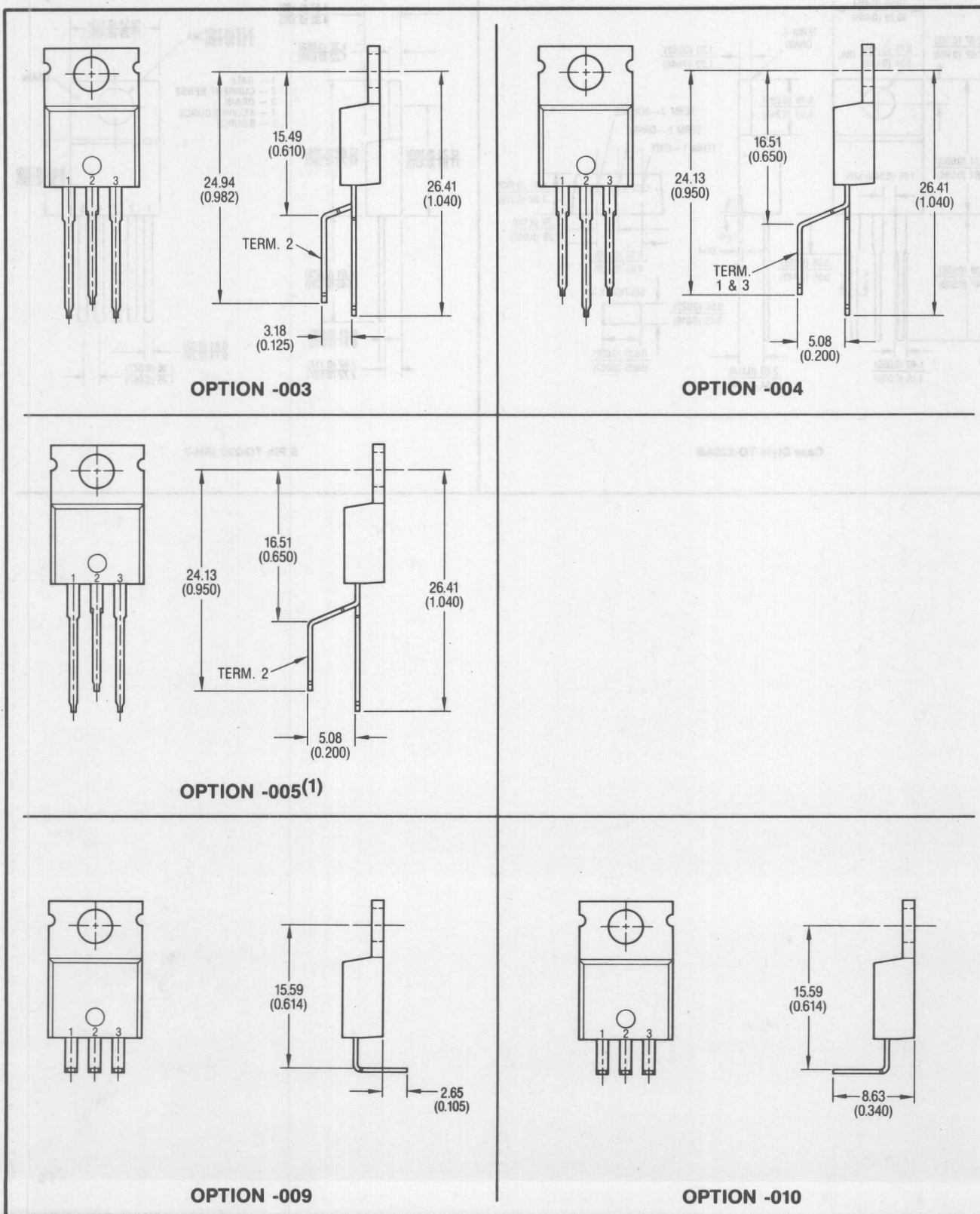
5 Pin TO-220 IRH-7

Tolerance ± 0.010 Inches.

Dimensions in Millimeters and (Inches)

TO-220 Optional Leadforms

International Rectifier now offers standard leadform in various configurations to allow the flexibility to meet the variety of design requirements. Shown below are IR's standard leadform offerings. To order a device with leadforming, simply state the desired TO-220 HEXFET Part Number then indicate the leadform of your choice with the three digit suffix. For the correct suffix refer to the leadform options which are shown below. Example: IRF530-004 is an IRF530 HEXFET with an option -004 leadform.

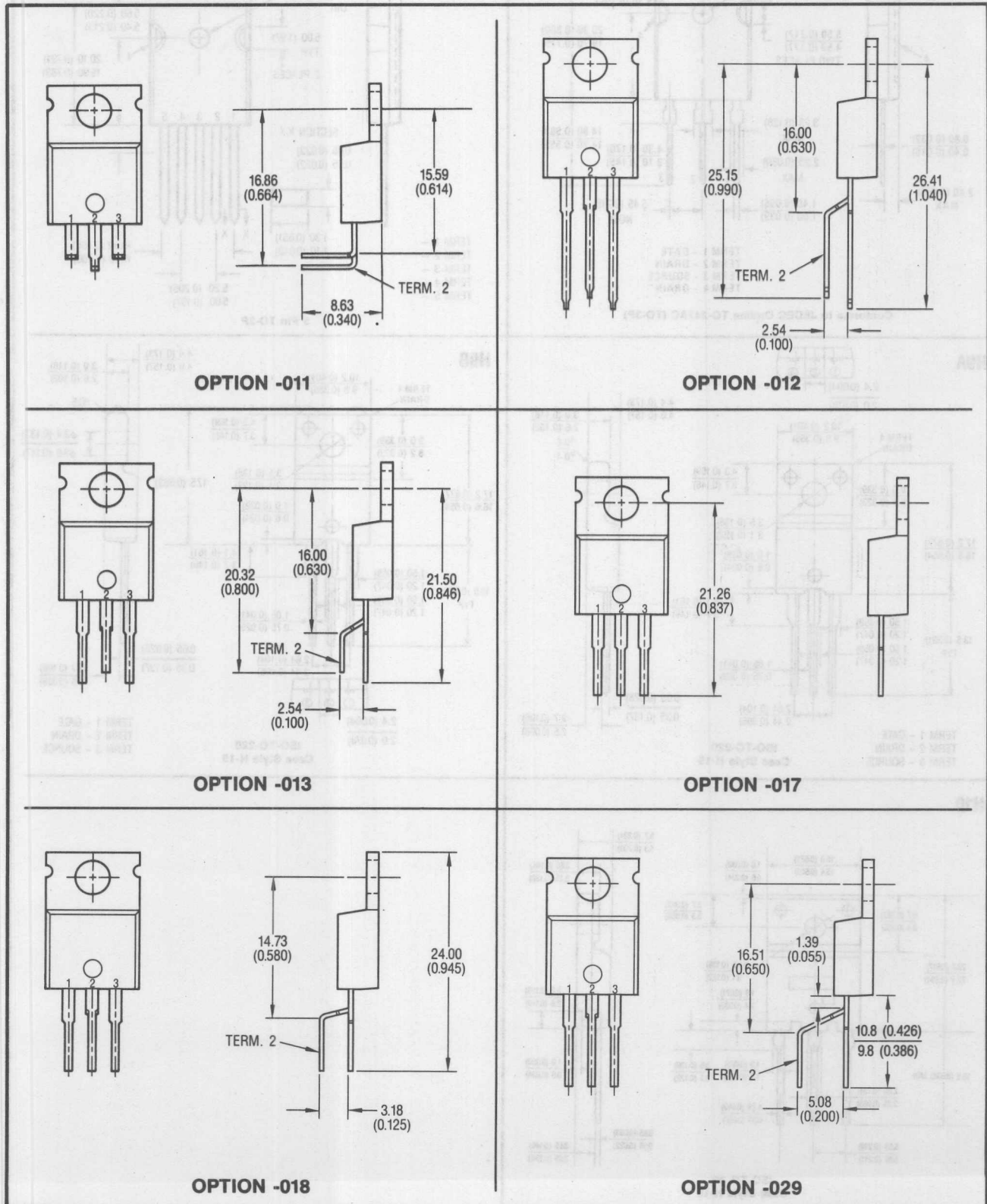


(1) For other dimensions see H5, page 153.

Dimensions in Millimeters and (Inches)

TO-220 Optional Leadforms

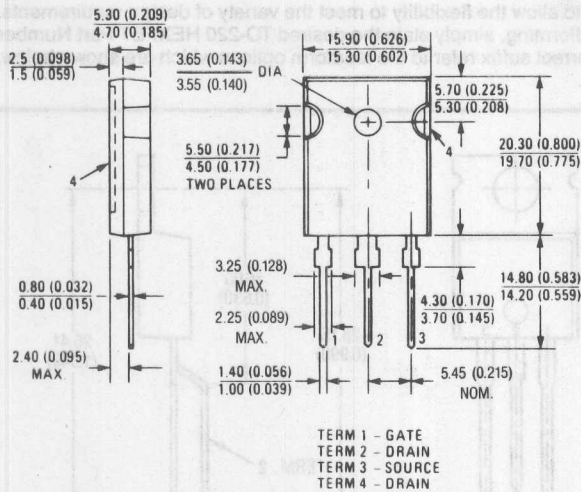
International Rectifier now offers standard leadform in various configurations to allow the flexibility to meet the variety of design requirements. Shown below are IR's standard leadform offerings. To order a device with leadforming, simply state the desired TO-220 HEXFET Part Number then indicate the leadform of your choice with the three digit suffix. For the correct suffix refer to the leadform options which are shown below. Example: IRF530-004 is an IRF530 HEXFET with an option -004 leadform.



Tolerance ± 0.010 Inches

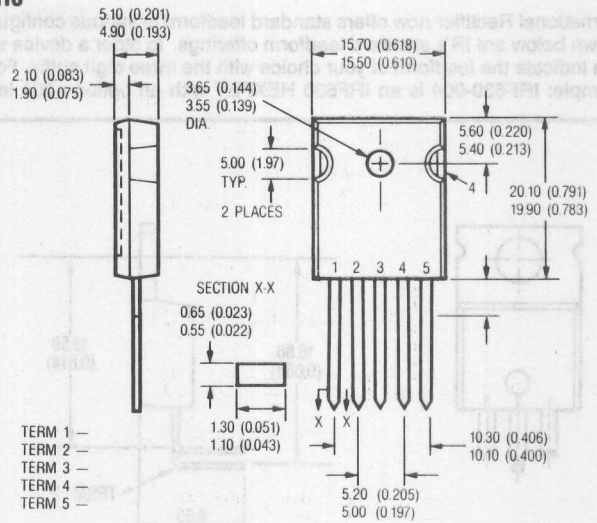
Dimensions in Millimeters and (Inches)

H7



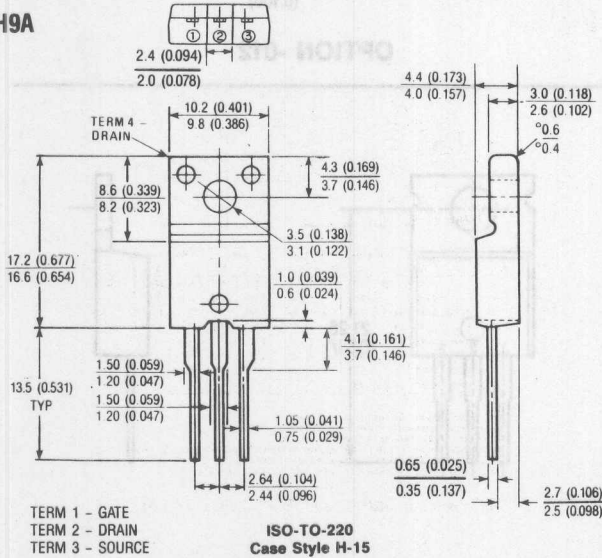
Conforms to JEDEC Outline TO-247AC (TO-3P)

H8



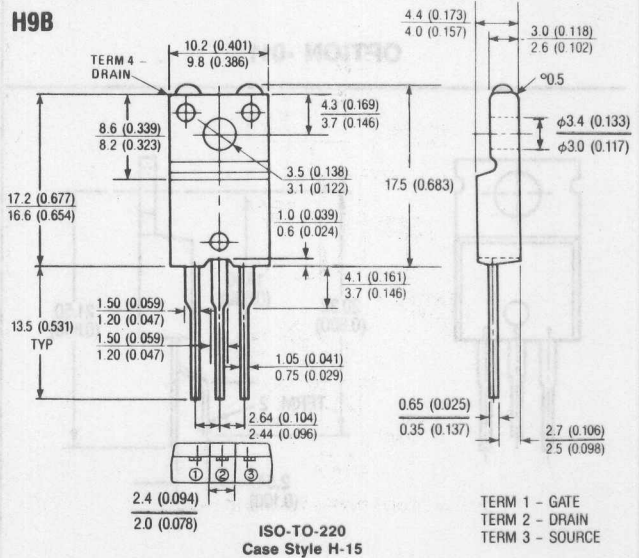
5 Pin TO-3P

H9A



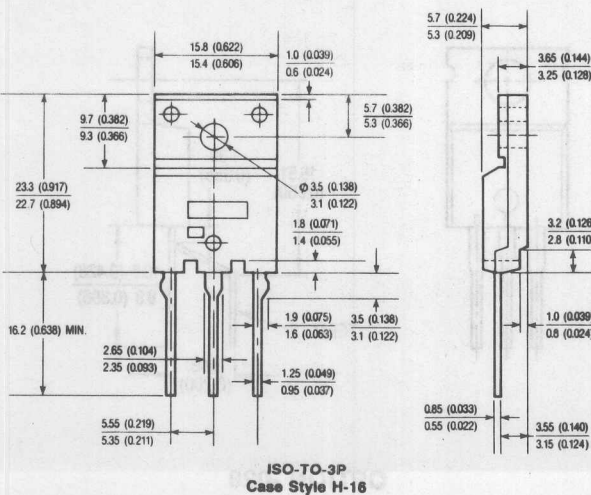
ISO-TO-220
Case Style H-15

H9B



ISO-TO-220
Case Style H-15

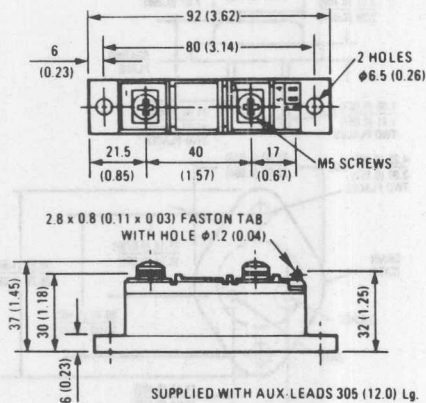
H10



ISO-TO-3P
Case Style H-16

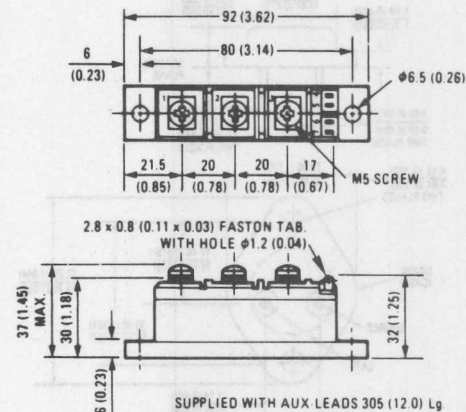
Dimensions in Millimeters and (Inches)

H11



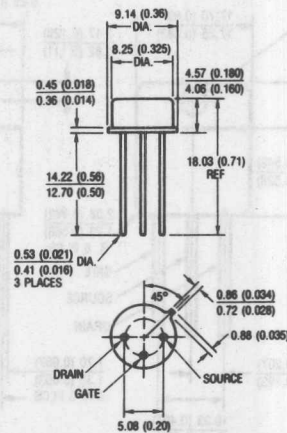
Similar to JEDEC Outline TO-240AA

H12



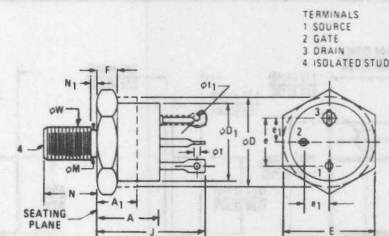
Similar to JEDEC Outline TO-240AA

H13



Conforms to JEDEC Outline TO-205AF (TO-39)

H14



Symbol		Inches		Millimeters		Notes	Symbol		Inches		Millimeters		Notes
		Min	Max	Min	Max				Min	Max	Min	Max	
A	0.375	0.400	0.420	8.26	11.08		J	0.640	0.875	1.626	27.23		
A ₁	0.270	0.280	0.290	6.86	7.62		oM	0.220	0.440	5.59	6.37		
oD	0.610	0.680	0.680	15.49	17.45		N	0.427	0.455	10.72	11.56		
oD ₁	0.570	0.610	0.610	14.48	15.48		N ₁	0.090	0.090	2.29	2.29		
E	0.687	0.687	0.684	17.45			ot	0.055	0.072	1.19	1.83		
e	0.340	0.415	0.864	10.54	5.5		ot ₁	0.466	0.077	1.17	1.96	4	
e ₁	0.170	0.213	4.32	5.41	5		oW	0.2275	0.2268	5.561	5.761	3	
F	0.090	0.150	2.29	3.81	1								

NOTES

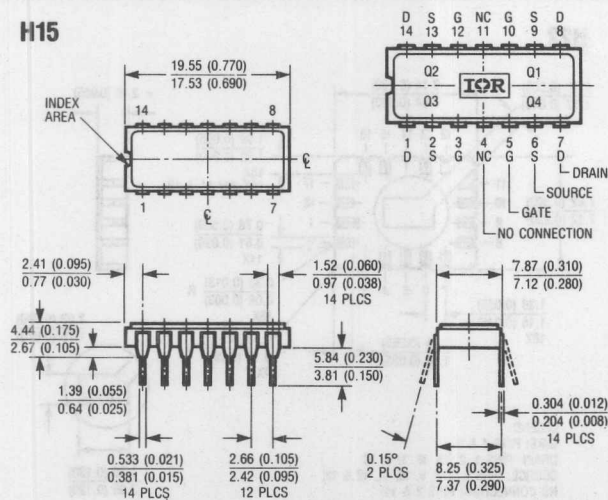
- 1 DIMENSION DOES NOT INCLUDE SEALING FLANGES
- 2 PACKAGE CONTOUR OPTIONAL WITHIN DIMENSIONS SPECIFIED
- 3 PITCH DIAMETER THREAD 1.428 UN-2A (COATED)

REFERENCE (SCREW THREAD STANDARDS FOR FEDERAL SERVICES HANDBOOK H-28)

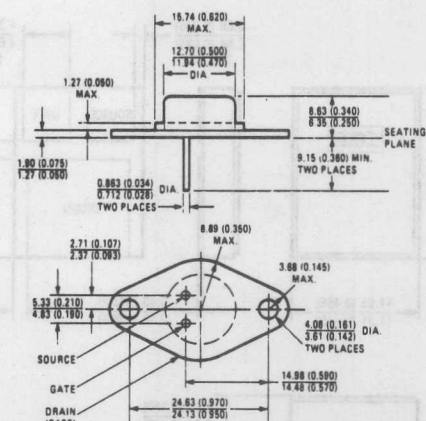
- 4 THIS TERMINAL CAN BE FLATTENED OR PIERCED OR HOOK TYPE
- 5 POSITION OF LEADS IN RELATION TO THE HEXAGON IS NOT CONTROLLED.

Conforms to JEDEC Outline TO-210AC (TO-61)

H15



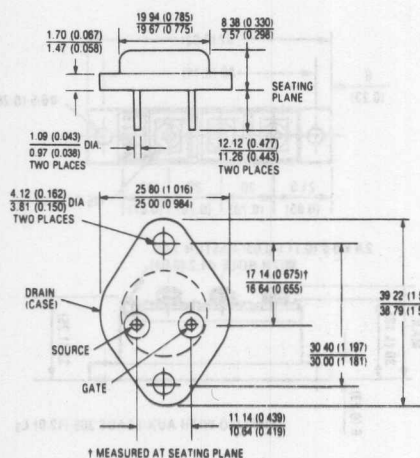
Conforms to JEDEC Outline MO-036AB

H16

Conforms to JEDEC Case Style TO-213AA (TO-66)

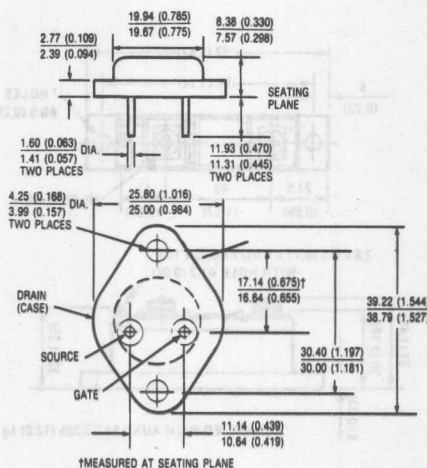
Dimensions in Millimeters and (Inches)

H17



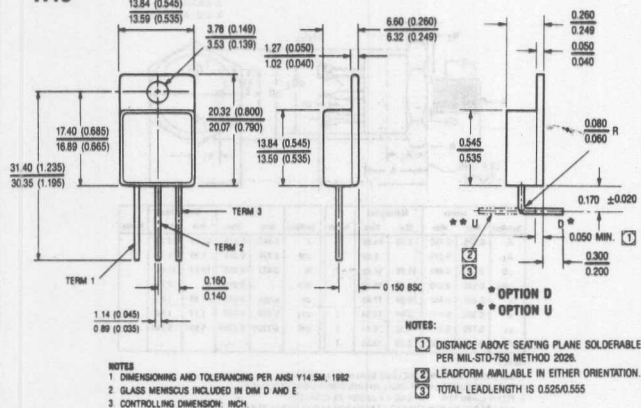
Conforms to JEDEC Outline TO-204AA (TO-3)

H18



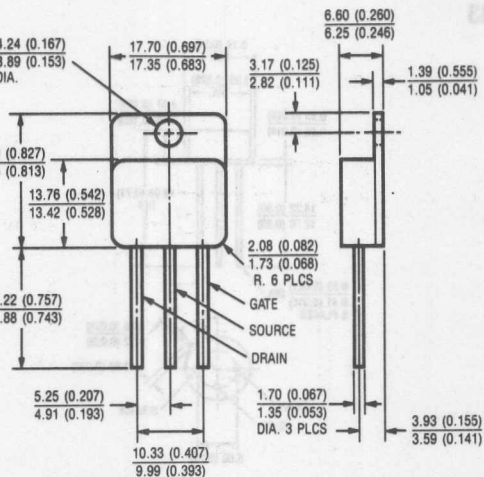
Conforms to JEDEC Outline TO-240AE (Modified TO-3)

H19



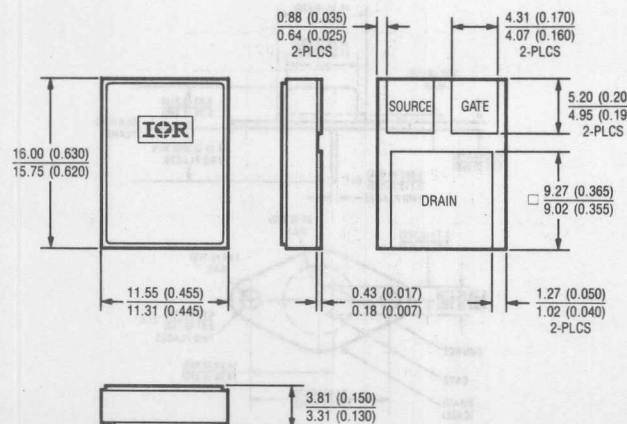
Conforms to JEDEC Outline TO-254AA

H20

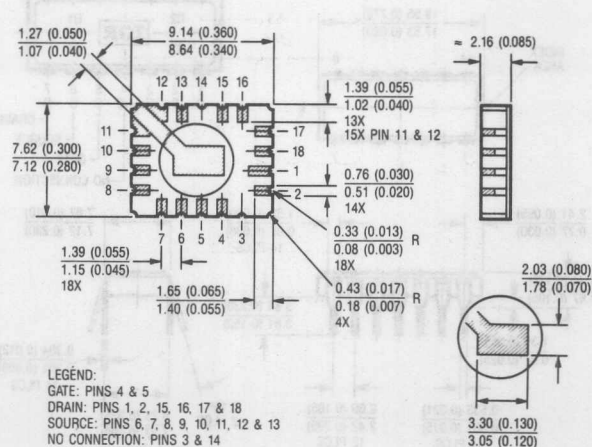


Conforms to JEDEC Outline TO-258

H21

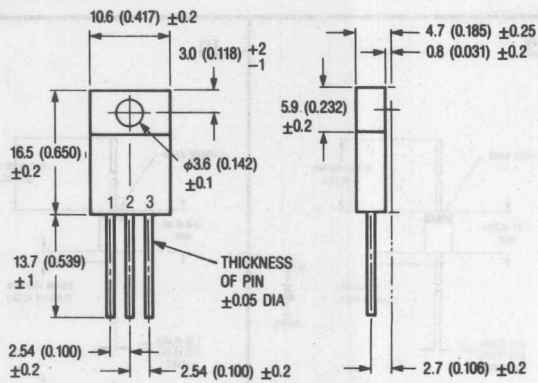


H22



Dimensions in Millimeters and (Inches)

H23

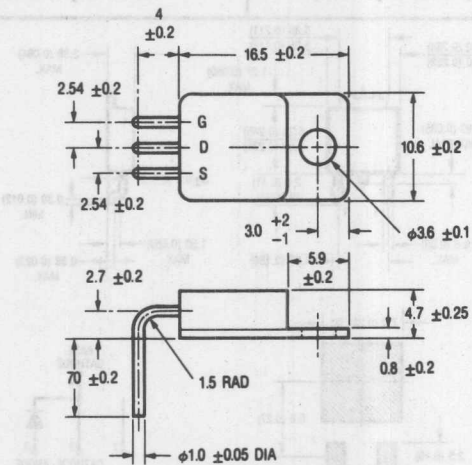


TERM	IRFY . . .	IRFY . . . M
1	GATE	DRAIN
2	DRAIN	SOURCE
3	SOURCE	GATE

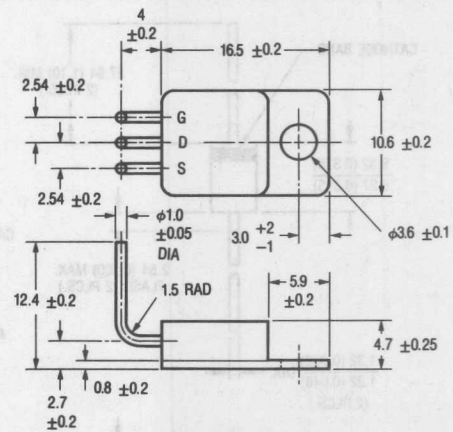
IR Case Style H-4

Optional Leadforms

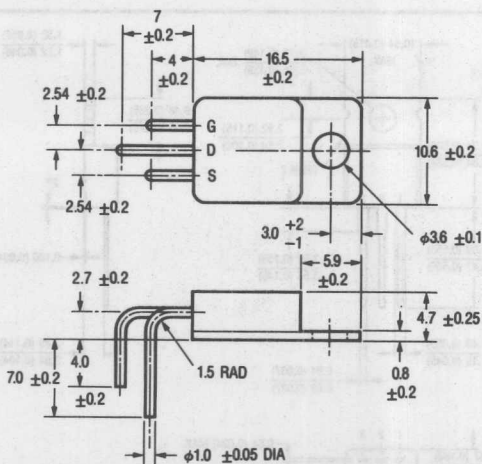
Shown below are IR's standard leadform options for IR case style #4. To specify add suffix shown eg. IRFY 450-101 etc.



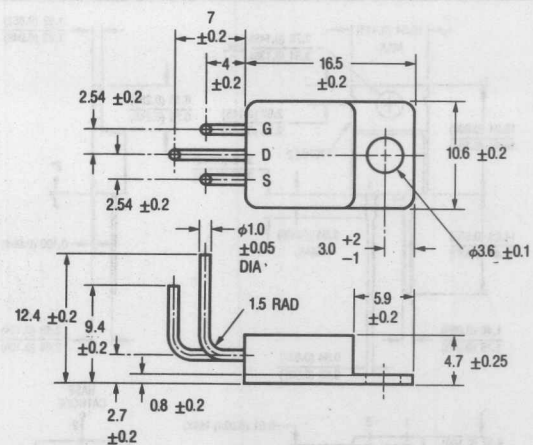
OPTION -100



OPTION -101



OPTION -102



OPTION -103

Tolerance Shown in Millimeter

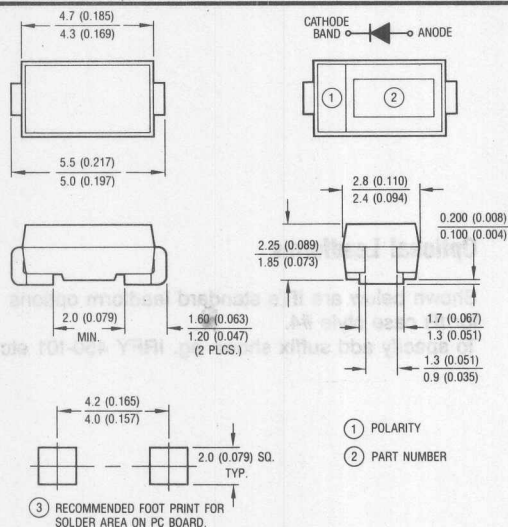
Dimensions in Millimeters

Ultra Fast Recovery and Schottky Rectifiers

Case Outlines

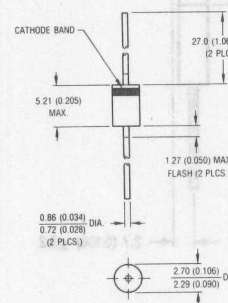
International
Rectifier

J1



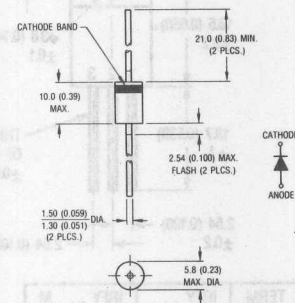
Case Style D-64

J2



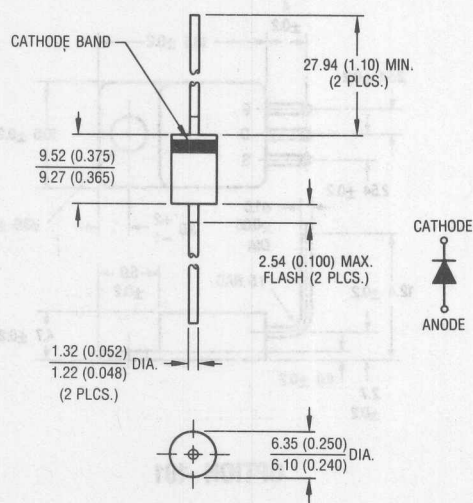
DO-240AL (DO-41)

J3



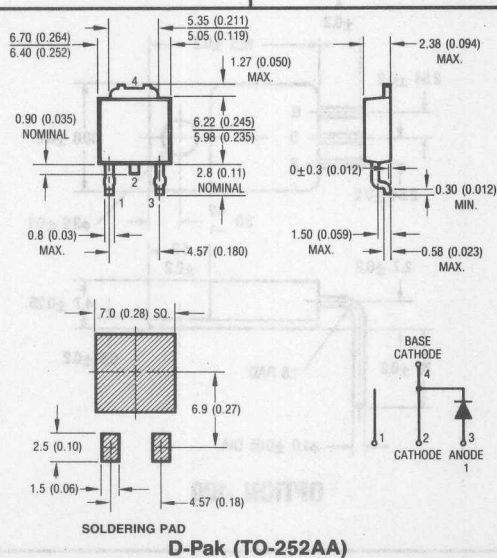
Case Style C-16

J4



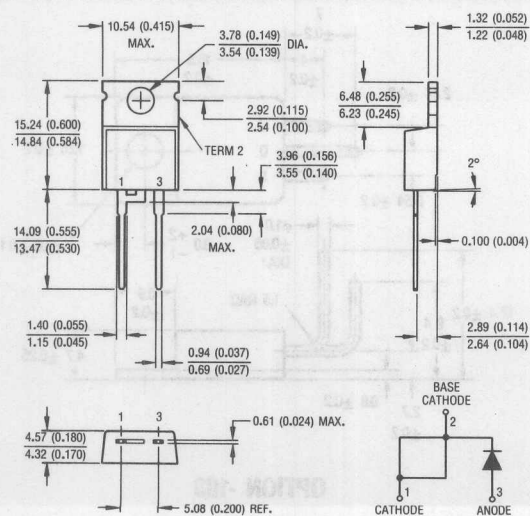
DO-204AR

J5



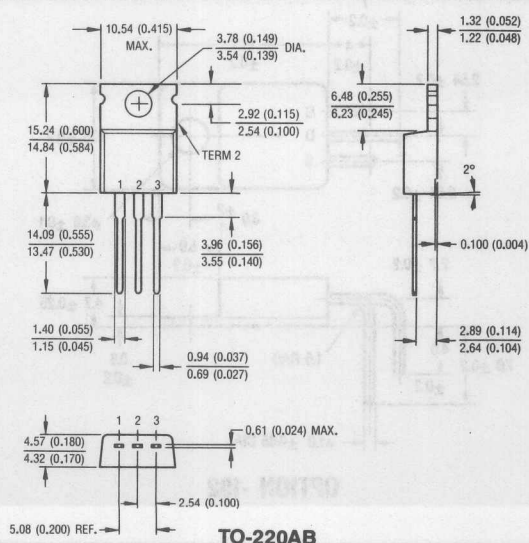
D-Pak (TO-252AA)

J6



TO-220AC

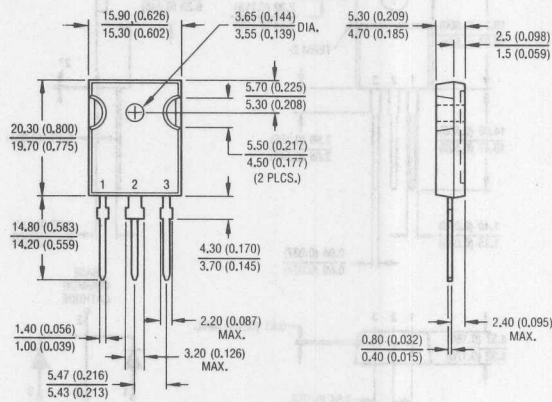
J7



TO-220AB

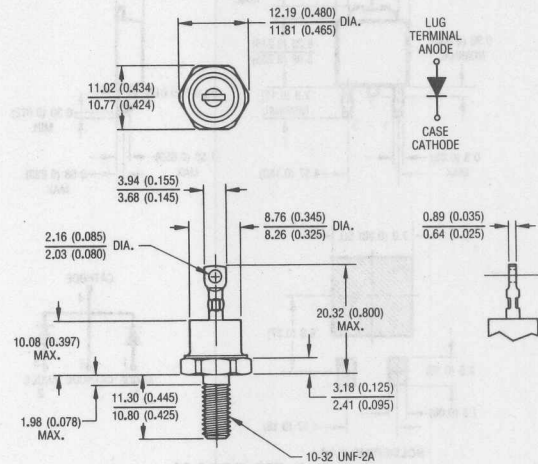
Dimensions in millimeters and (inches)

J8



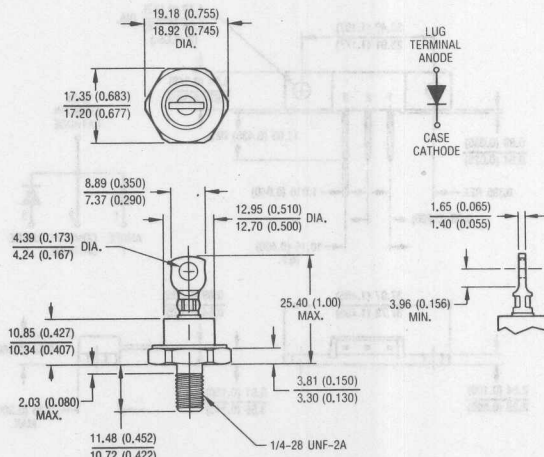
TO-247AC (TO-3P)

J9



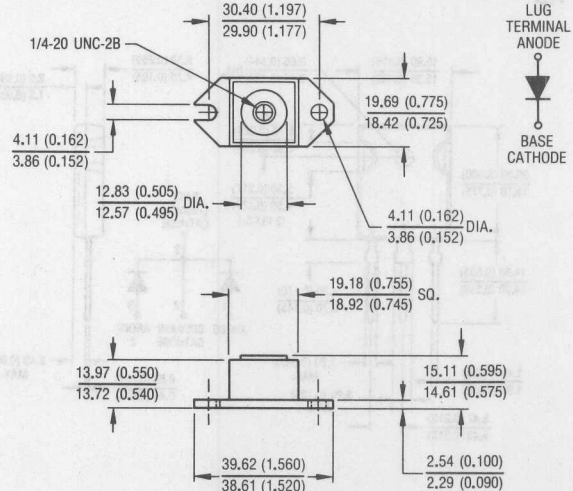
DO-203AA (DO-4)

J10



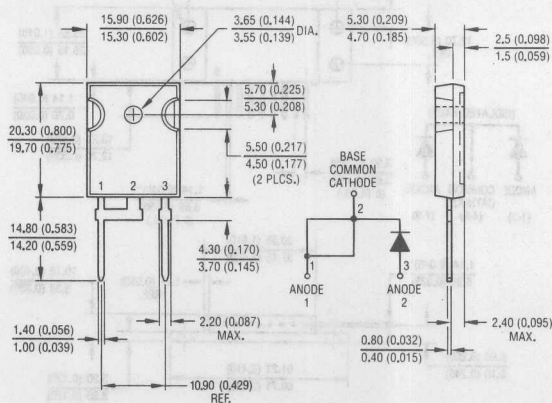
DO-203AB (DO-5)

J11



Half Pak Module

J12



MODIFIED TO-247AC (TO-3P)

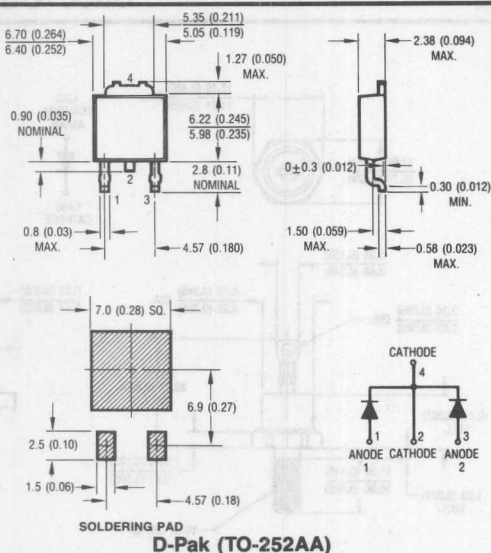
Schottky Rectifiers

Center Tap Devices

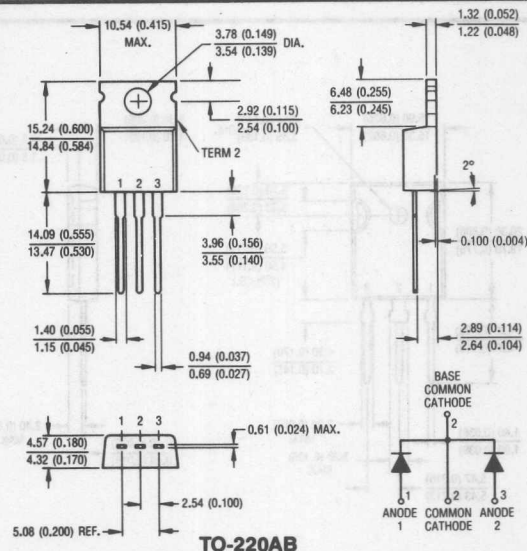
Case Outlines

International
IOR Rectifier

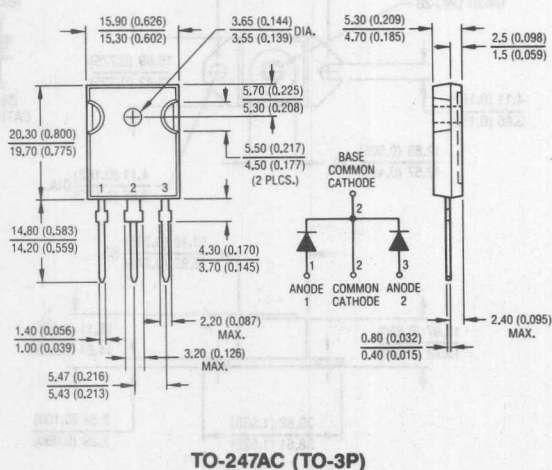
K1



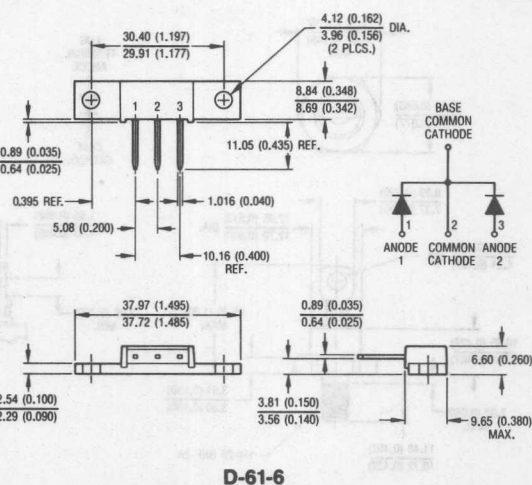
K2



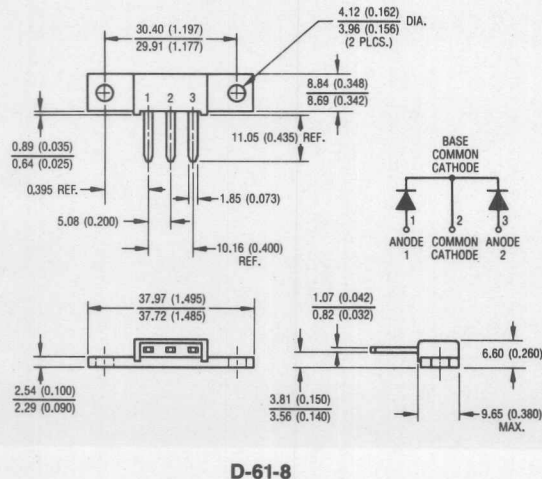
K3



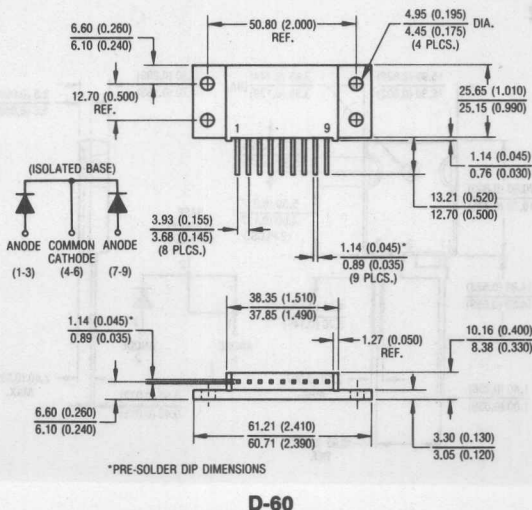
K4



K5

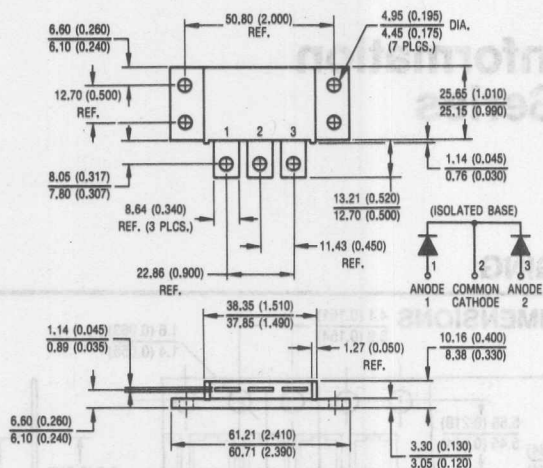


K6

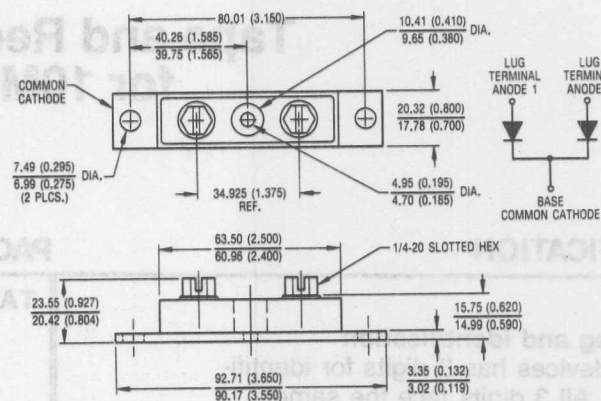


Dimensions in millimeters and (inches)

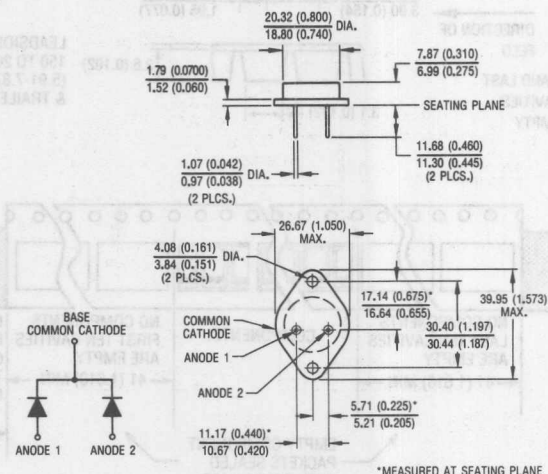
K7



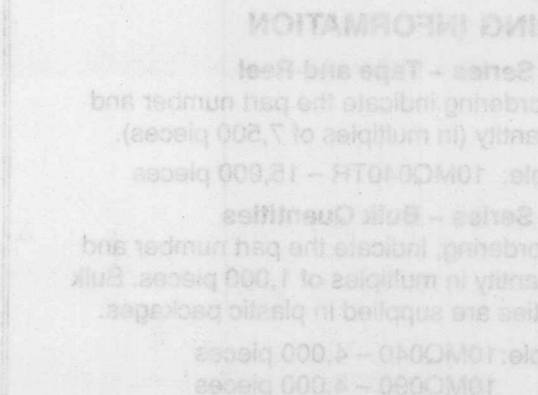
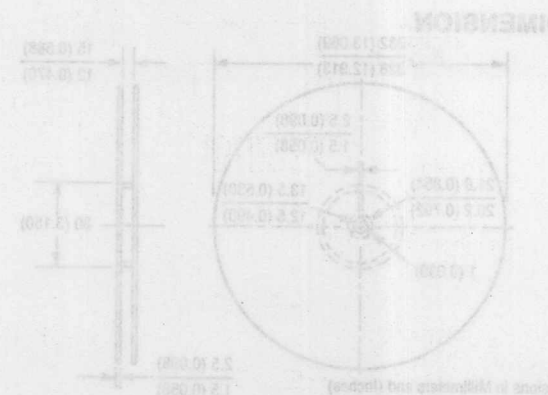
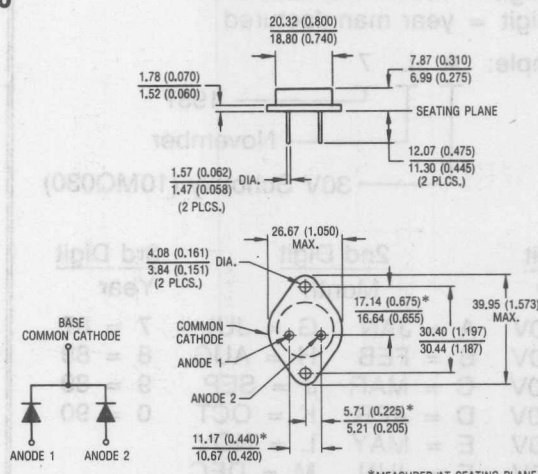
K8



K9



K10



Dimensions in millimeters and (inches)

Ultra Fast Recovery and Schottky Rectifier

Case Outlines

**International
IOR Rectifier**

Tape and Reel Information for 10MQ Series

IDENTIFICATION

Marking and identification

Each device has 3 digits for identification. All 3 digits face the same direction. See the drawing below for the marking code.

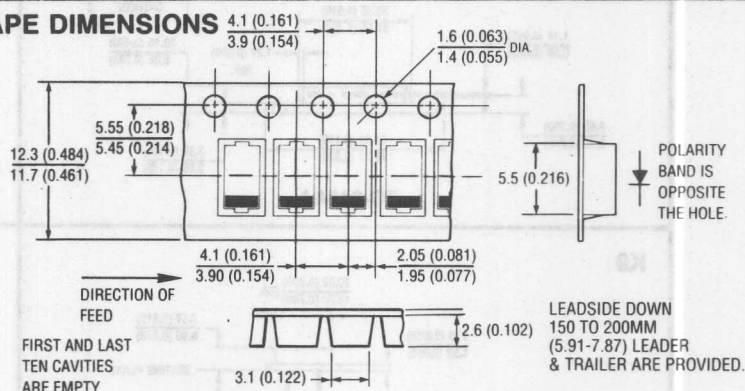
1st digit = device type & voltage
2nd digit = month manufactured
3rd digit = year manufactured

Example: A L 7
 1987
 November
 30V Schottky (10MQ030)

1st Digit	2nd Digit	3rd Digit
Schottky	Month	Year
A = 30V	A = JAN	7 = 87
B = 40V	B = FEB	8 = 88
C = 50V	C = MAR	9 = 89
D = 60V	D = APR	0 = 90
E = 90V	E = MAY	
F = 100V	F = JUN	
G = 200V	M = DEC	
	G = JUL	
	H = AUG	
	J = SEP	
	K = OCT	
	L = NOV	
	M = DEC	

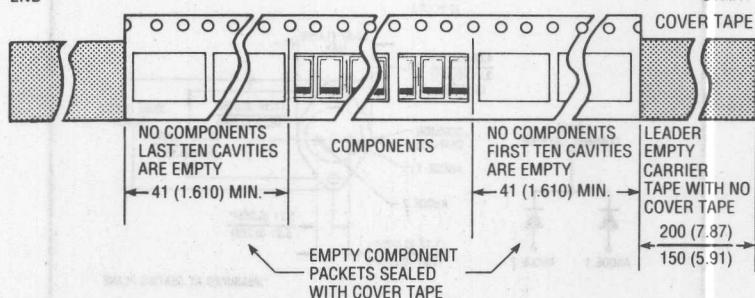
PACKAGING

TAPE DIMENSIONS



END

START



ORDERING INFORMATION

10MQ Series – Tape and Reel

when ordering indicate the part number and the quantity (in multiples of 7,500 pieces).

Example: 10MQ040TR – 15,000 pieces

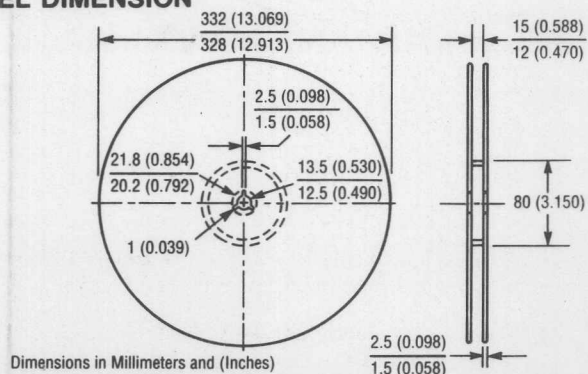
10MQ Series – Bulk Quantities

when ordering, indicate the part number and the quantity in multiples of 1,000 pieces. Bulk quantities are supplied in plastic packages.

Example: 10MQ040 – 4,000 pieces

10MQ090 – 4,000 pieces

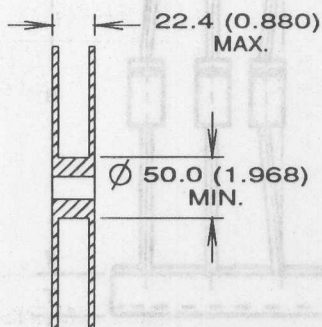
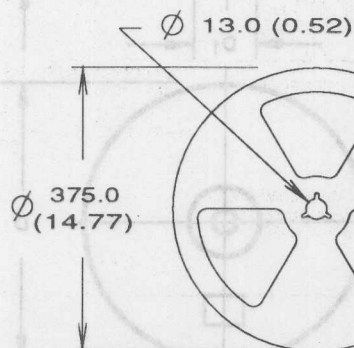
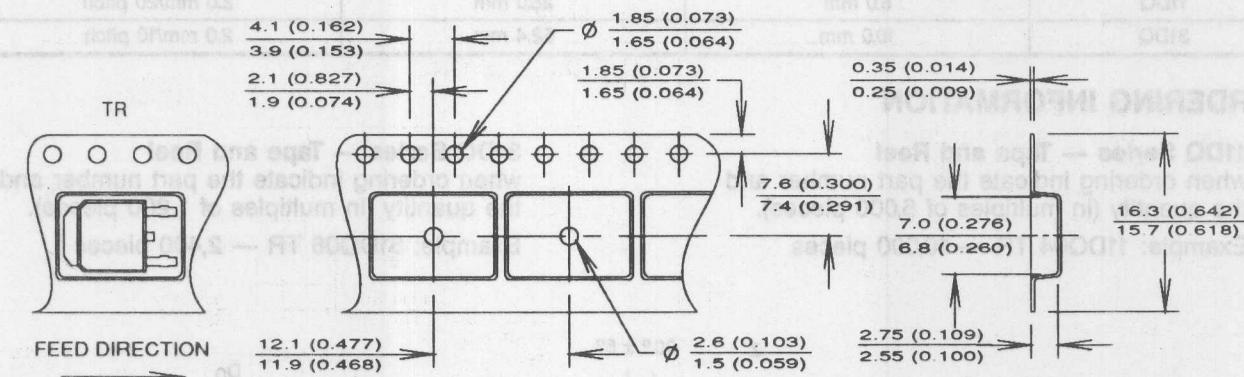
REEL DIMENSION



**7500
Pieces
Per Reel**

Dimensions in Millimeters and (Inches)

Tape and Reel Information for 30WQ, 50WQ, and 6CWQ Series



TO-252AA Tape & Reel

When ordering, indicate the part number and the quantity. Quantities are in multiples of 2,000 pieces per reel for TR.

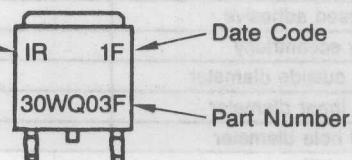
e.g., 30WQ04F TR three-reel order
is 6,000 pieces.

TO-252AA (D-Pak)

Part Marking Information

Example: This is 30WQ04F with Date Code 1F.

**International Rectifier
Logo**



Ultra Fast Recovery and Schottky Rectifier

Case Outlines

**International
IOR Rectifier**

Tape and Reel Information for 11DQ and 31DQ Series

Axial lead devices are packed in accordance with EIA standard RS-296-D and specifications given below.

SERIES	COMPONENT PITCH A	INNER TAPE PITCH B	CUMULATIVE PITCH TOLERANCE
	$\pm 0.5 \text{ mm (0.020")}$	$\pm 1.5 \text{ mm (0.059")}$	
11DQ	5.0 mm	26.0 mm	2.0 mm/20 pitch
31DQ	10.0 mm	52.4 mm	2.0 mm/10 pitch

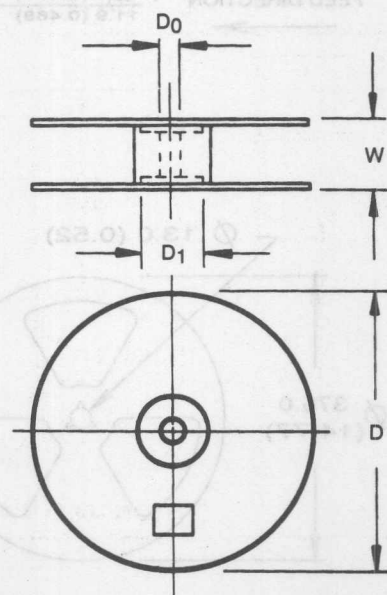
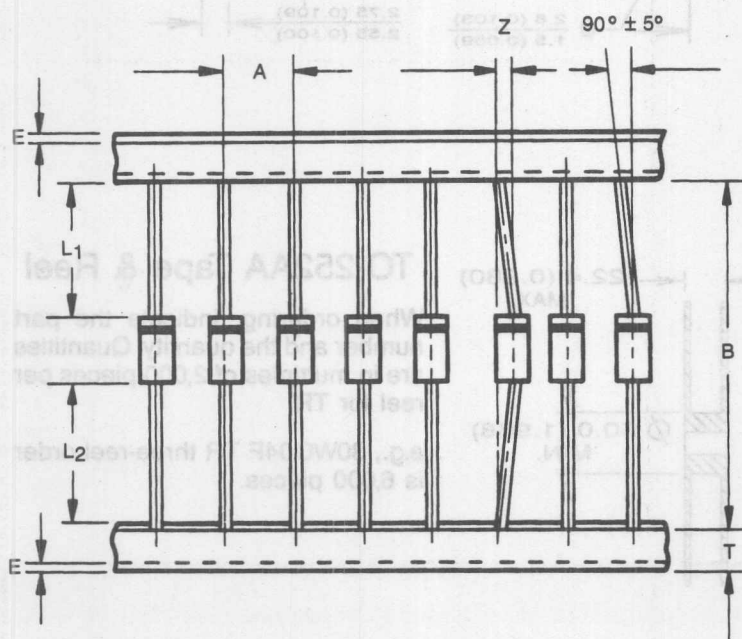
ORDERING INFORMATION

11DQ Series — Tape and Reel
when ordering indicate the part number and
the quantity (in multiples of 5,000 pieces).

Example: 11DQ04 TR — 10,000 pieces

31DQ Series — Tape and Reel
when ordering indicate the part number and
the quantity (in multiples of 1,200 pieces).

Example: 31DQ06 TR — 2,400 pieces



11DQ Series — 5,000 per reel

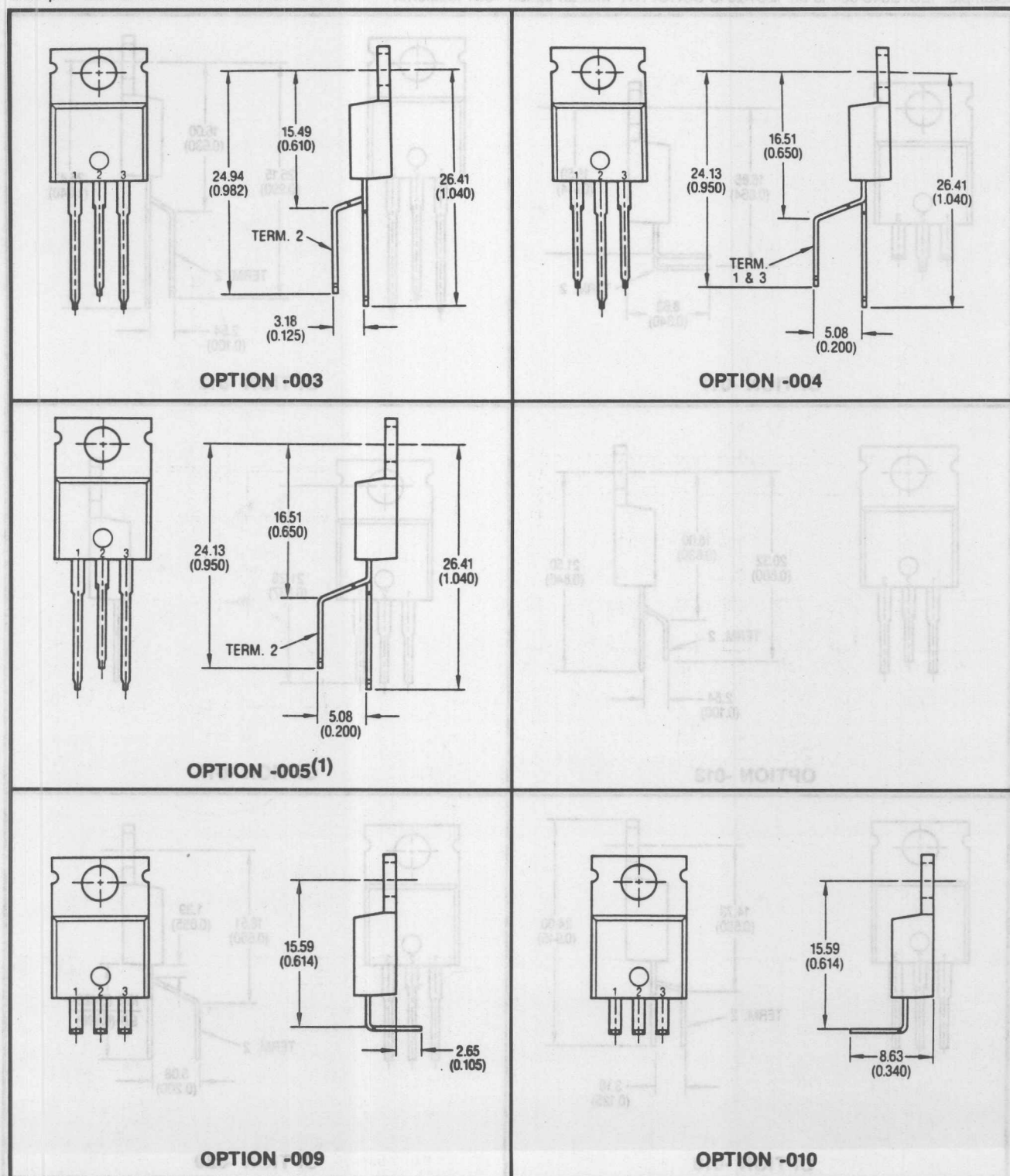
31DQ Series — 1,200 per reel

ITEM	SYMBOL	SPECIFICATIONS (mm)	SPECIFICATIONS (inch)
Component alignment	Z	1.2 max.	0.048 max.
Tape width	T	6.0 ± 0.4	0.236 ± 0.016
Exposed adhesive	E	0.8 max.	0.032 max.
Body eccentricity	$ L_1 - L_2 $	1.0 max.	0.040 max.
Reel outside diameter	D	330.0	13.0
Reel inner diameter	D ₁	85.7 ± 0.3	3.375 ± 0.012
Feed hole diameter	D ₀	16.6 ± 0.4	0.655 ± 0.016
Reel width	W	79.0 ± 1.0	3.110 ± 0.040

NOTE: 1. Each component lead shall be sandwiched between tapes for a minimum of 3.2 mm (0.126").
2. The reel width 'W' for 26 mm taping is $50.0 \pm 1.0 \text{ mm (1.97" } \pm 0.040\text{")}$

TO-220 Optional Leadforms

International Rectifier now offers standard leadform in various configurations to allow the flexibility to meet the variety of design requirements. Shown below are IR's standard leadform offerings. To order a device with leadforming, simply state the desired TO-220 SCHOTTKY Part Number then indicate the leadform of your choice with the three digit suffix. For the correct suffix refer to the leadform options which are shown below. Example: 12CTQ045-004 is an 12CTQ045 SCHOTTKY with an option -004 leadform.



Tolerance ± 0.010 Inches

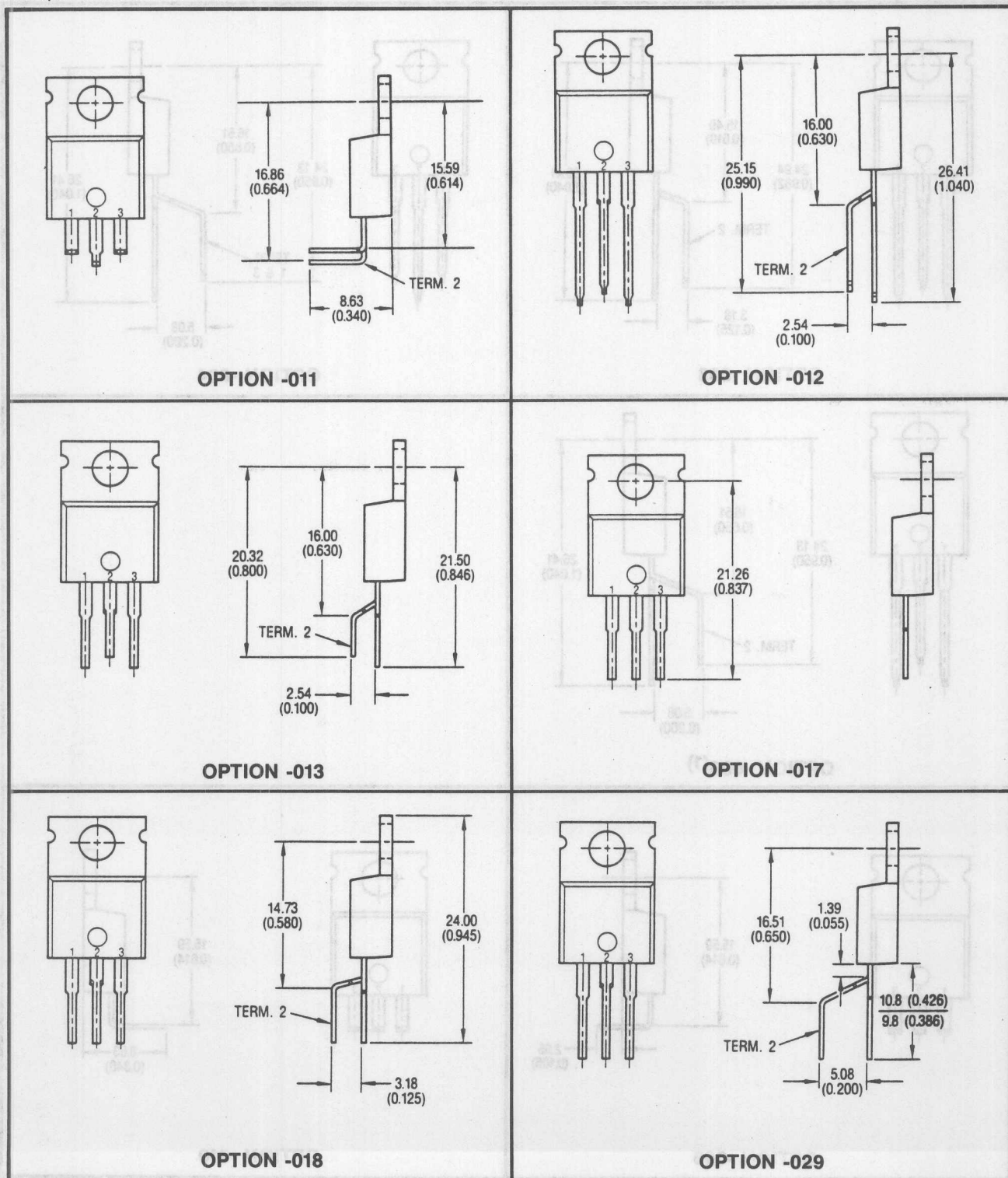
Dimensions in Millimeters and (Inches)

Ultra Fast Recovery and Schottky Rectifier Case Outlines

**International
IOR Rectifier**

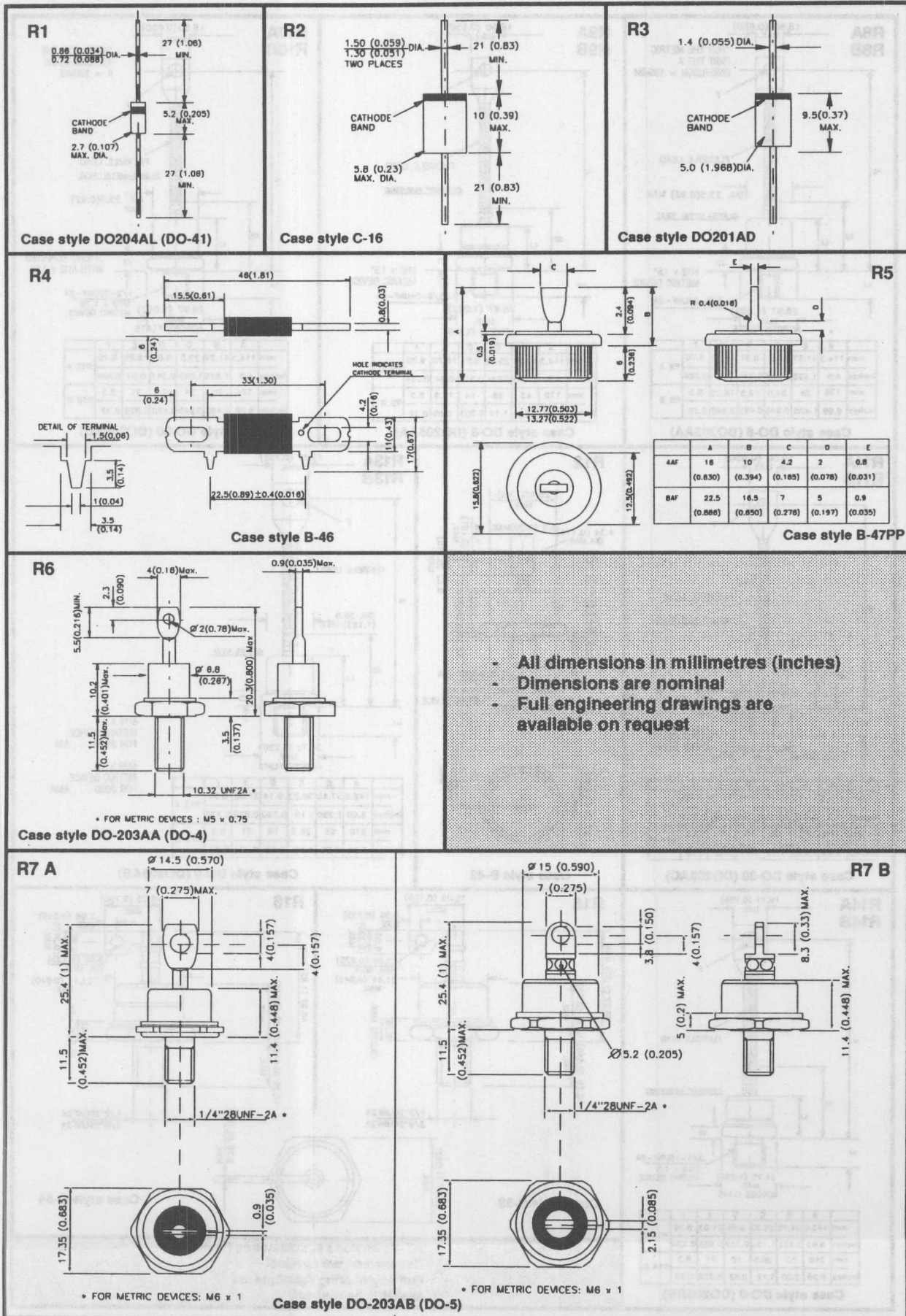
TO-220 Optional Leadforms

International Rectifier now offers standard leadform in various configurations to allow the flexibility to meet the variety of design requirements. Shown below are IR's standard leadform offerings. To order a device with leadforming, simply state the desired TO-220 SCHOTTKY Part Number then indicate the leadform of your choice with the three digit suffix. For the correct suffix refer to the leadform options which are shown below. Example: 12CTQ045-004 is an 12CTQ045 SCHOTTKY with an option -004 leadform.



Tolerance ± 0.010 Inches

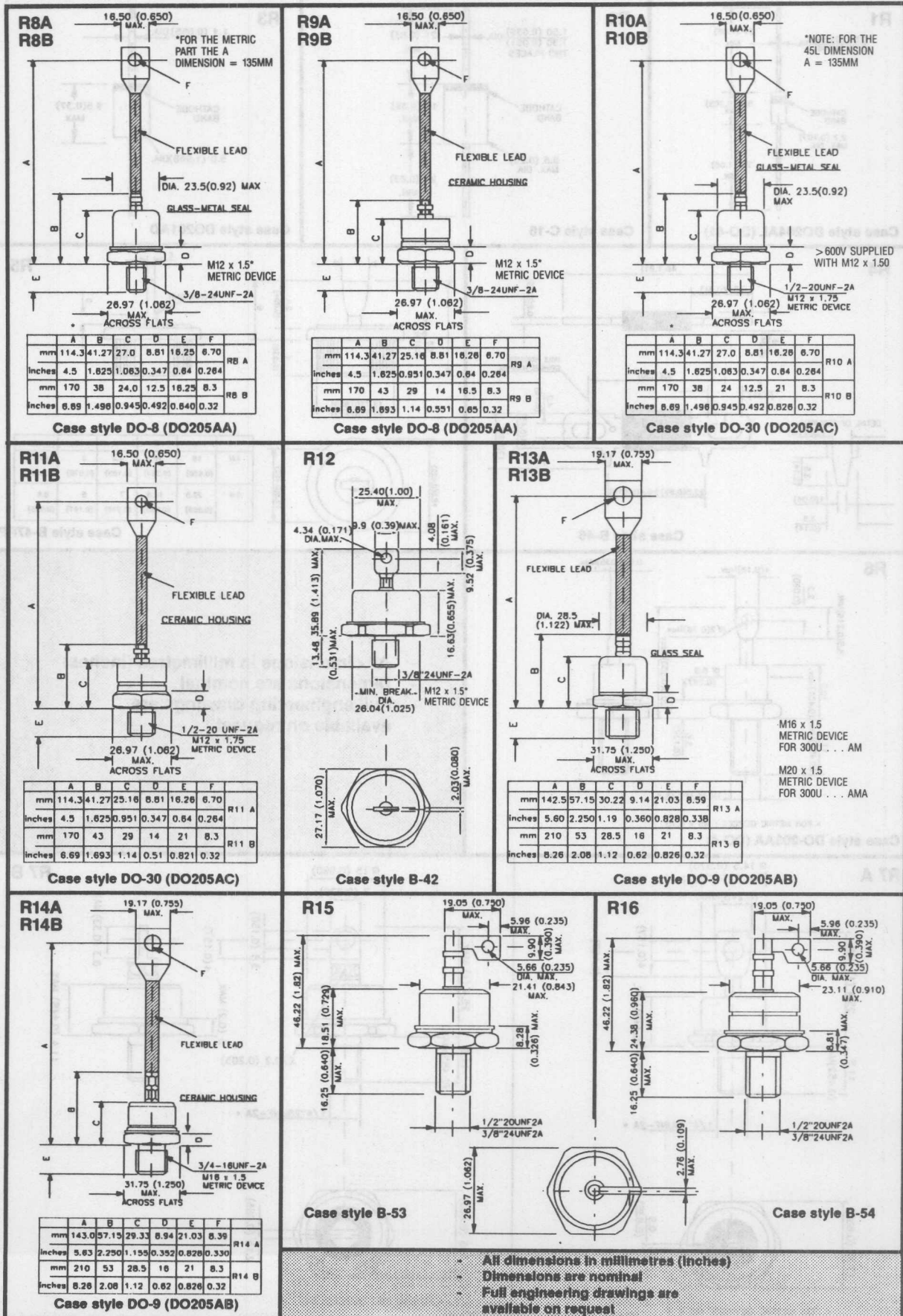
Dimensions in Millimeters and (Inches)



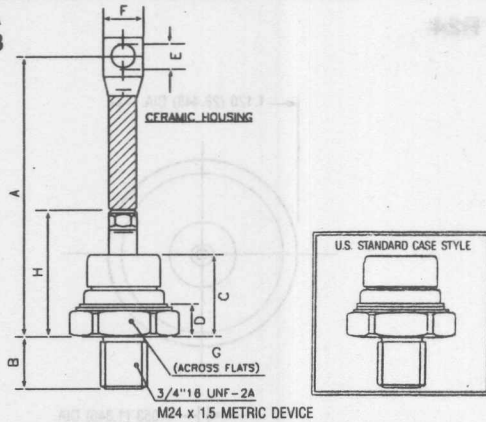
Power Rectifiers

Case Outlines

International
IOR Rectifier



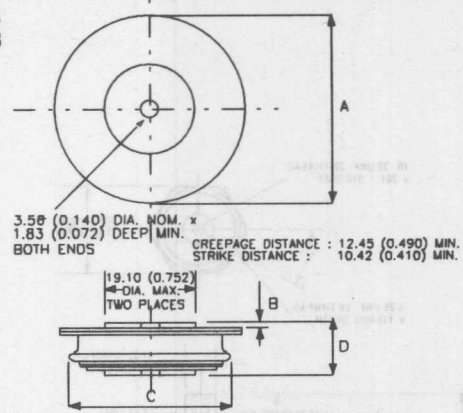
**R17A
R17B**



	A	B	C	D	E	F	G	H	
mm	243	27.81	33.61	11.50	10.08	25.14	42.84	69.85	R17A
inches	9.58	1.093	1.402	0.453	0.396	0.990	1.687	2.750	
mm	250	27.3	47	21	10.5	28	44.5	80	R17B
inches	9.84	1.08	1.85	0.83	0.413	1.023	1.75	3.15	

* "B" dimension for metric devices = 20.3(0.807)
Case style B-8

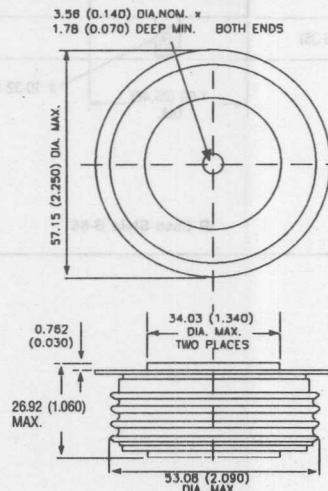
**R18A
R18B**



	A	B	C	D	
mm	41.27	0.77	37.08	13.65/14.35	R18 A
inches	1.625	0.030	1.460	0.537/0.565	
mm	42	0.3	38.1	13.1/14.4	R18 B
inches	1.653	0.011	1.5	0.515/0.568	

Case style DO-200AA

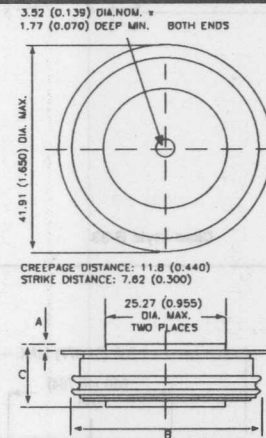
R19



CREEPAGE DISTANCE: 38.8 (1.520)
STRIKE DISTANCE: 23.12 (0.910)

Case style DO-200AB

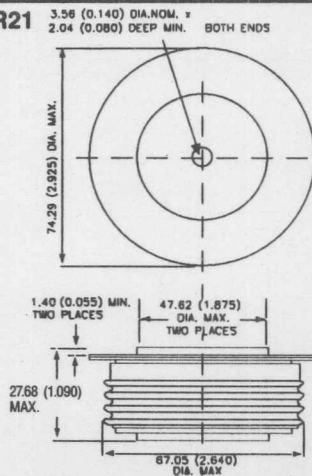
**R20A
R20B**



	A	B	C	
mm	0.78	40.26	14.88/15.52	R20 A
inches	0.030	1.585	0.585/0.611	
mm	0.3	40.1	14.15/15.1	R20 B
inches	0.011	1.578	0.557/0.594	

Case style B-43

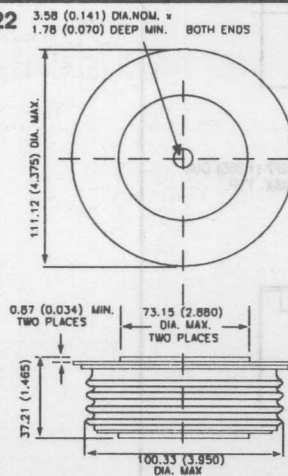
R21



CREEPAGE DISTANCE: 32.26(1.270)
STRIKE DISTANCE: 23.78 (0.938)

Case style DO-200AC

R22

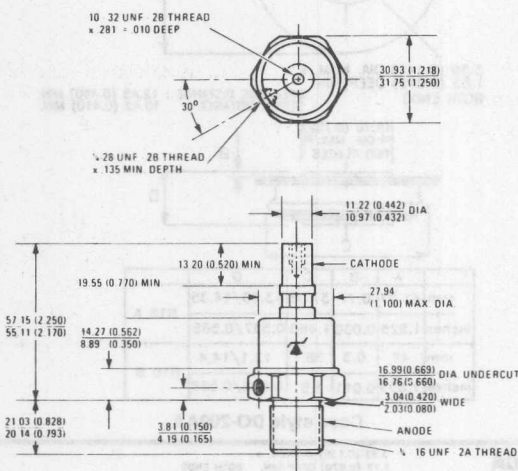


CREEPAGE DISTANCE: 51.82(2.04) MIN.
STRIKE DISTANCE: 32.52 (1.280) MIN.

Case style B-44

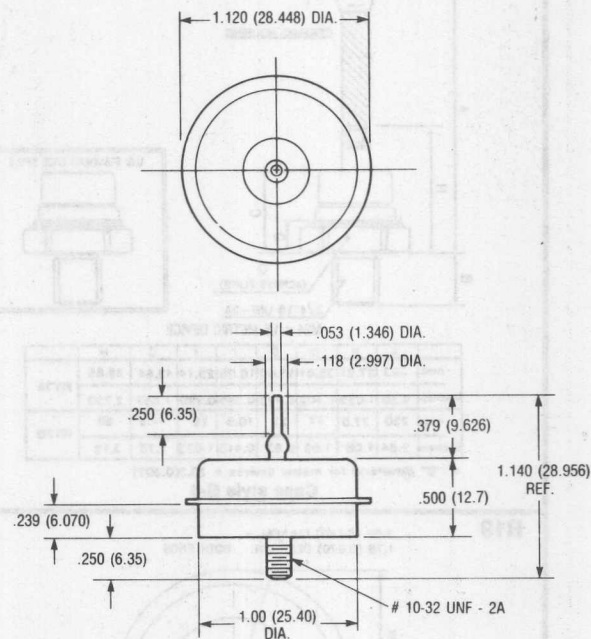
• All dimensions in millimetres (inches)
• Dimensions are nominal
• Full engineering drawings are available on request

R23



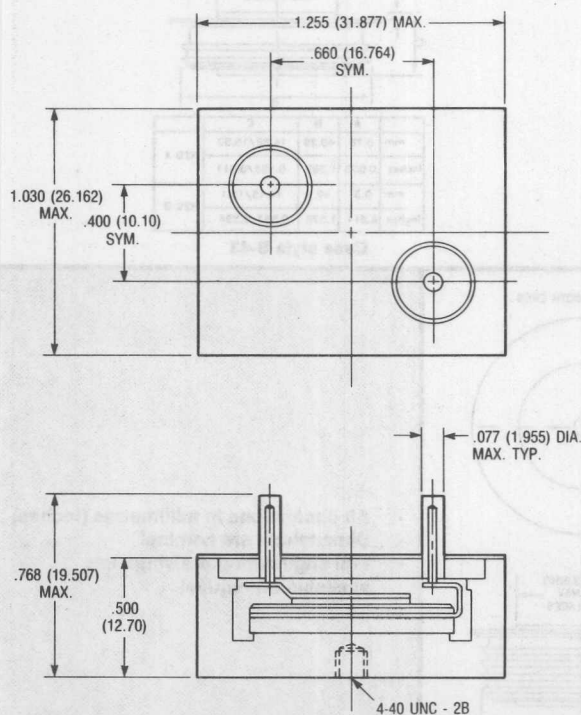
Case Style B-33

R24



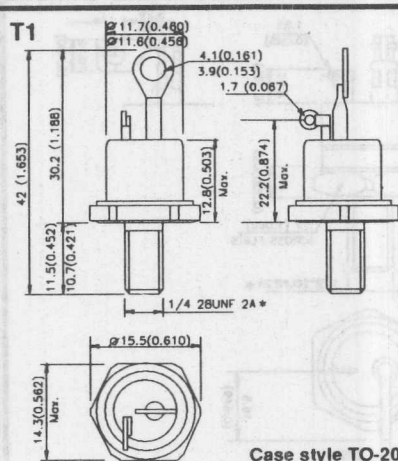
IR Case Style B-65

R25



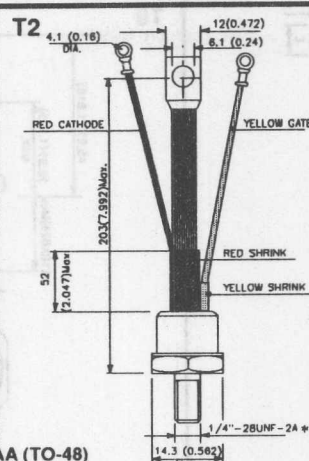
IR Case Style B-67

Dimensions in Millimeters and (Inches)



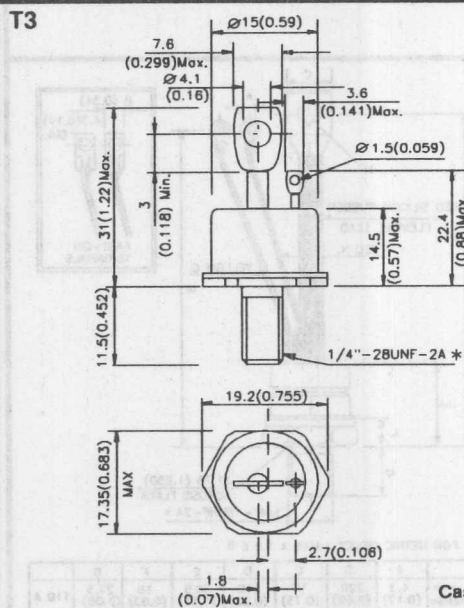
Case style TO-208AA (TO-48)

* FOR METRIC DEVICES: M6 x 1



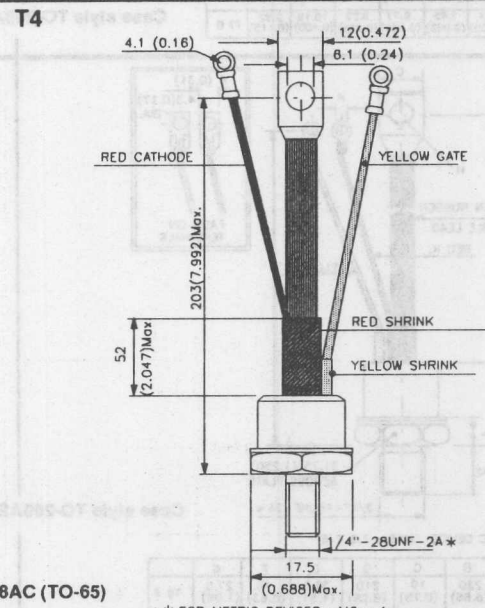
* FOR METRIC DEVICES: M6 x 1

• All dimensions in millimetres (inches)
• Dimensions are nominal
• Full engineering drawings are available on request

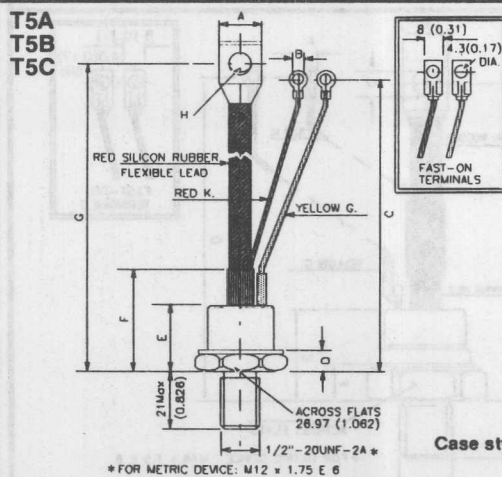


Case style TO-208AC (TO-65)

* FOR METRIC DEVICES: M6 x 1



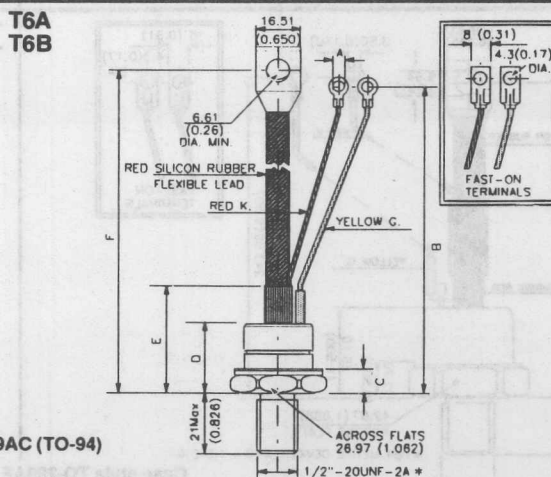
* FOR METRIC DEVICES: M6 x 1



Case style TO-209AC (TO-94)

* FOR METRIC DEVICE: M12 x 1.75 E 6

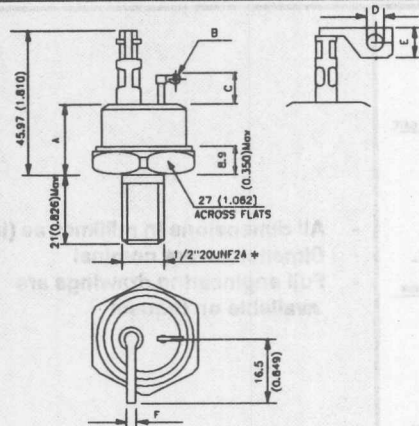
	A	B	C	D	E	F	G	H	
mm	15	7.6	173.99	8.9	20.5	58	160	8.3	T5 A
inches	(0.59)	(0.299)	(6.850)	(0.350)	(0.807)	(2.283)	(6.299)	(0.326)	
mm	16.51	4.3	215	12.5	29	170	6.6	6.8	T5 B
inches	(0.650)	(0.17)	(8.46)	(0.49)	(1.141)	(6.69)	(0.26)	(0.26)	
mm	14.80	3.56	173.99	8.9	20.44	38.1	154.49	6.8	T5 C
inches	(0.575)	(0.140)	(6.850)	(0.350)	(0.805)	(1.500)	(6.082)	(0.26)	



* FOR METRIC DEVICE: M12 x 1.75 E 6

	A	B	C	D	E	F	
mm	4.3	215	12.5	29	36.83	170	T6 A
inches	(0.17)	(8.46)	(0.49)	(1.141)	(1.450)	(6.69)	
mm	3.56	173.99	8.9	28.57	58	152.91	T6 B
inches	(0.140)	(6.850)	(0.350)	(1.125)	(2.283)	(6.020)	

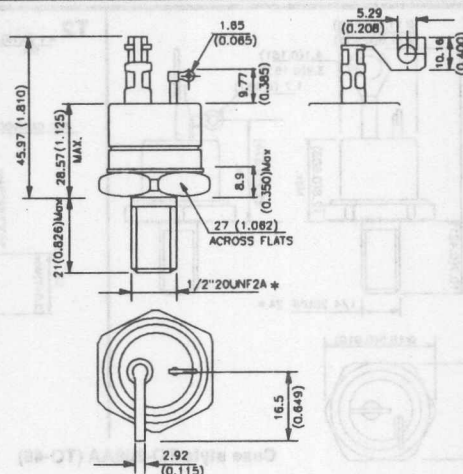
**T7A
T7B**



* FOR METRIC DEVICE: M12 x 1.75 E 8

	A	B	C	D	E	F	
mm	20.5	1.8	9.5	3.5	1.0	2.3	T7 A
inches	(0.807)	(0.07)	(0.374)	(0.138)	(0.039)	(0.090)	
mm	20.4	1.85	9.77	3.28	10.18	2.32	T7 B
inches	(0.805)	(0.073)	(0.385)	(0.129)	(0.405)	(0.091)	

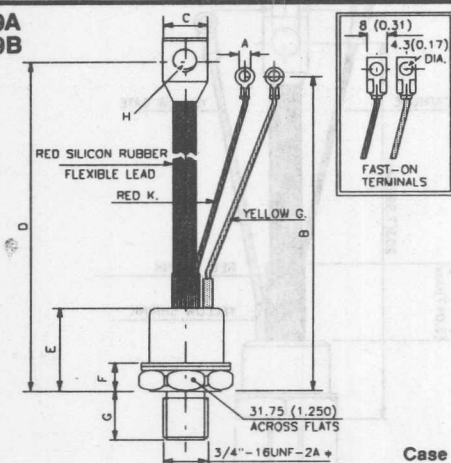
T8



* FOR METRIC DEVICE: M12 x 1.75 E 8

Case style TO-208AD (TO-83)

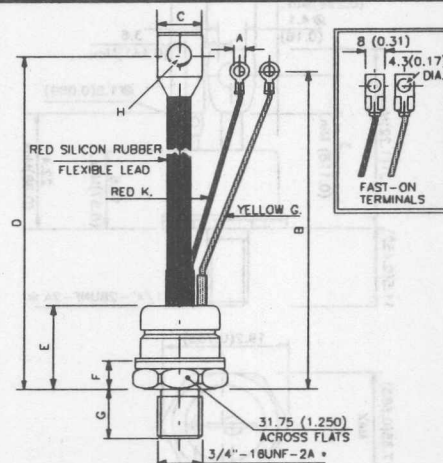
**T9A
T9B**



* FOR METRIC DEVICE: M16 x 1.5 E 8

	A	B	C	D	E	F	G	
mm	4.3	220	19	210	38.5	16	27.5	T9 A
inches	(0.17)	(8.66)	(0.75)	(8.26)	(1.51)	(0.63)	(1.08)	
mm	3.56	196.21	19.17	186.64	31.75	9.27	27.35	T9 B
inches	(0.140)	(7.725)	(0.755)	(7.35)	(1.250)	(0.365)	(1.077)	

**T10A
T10B**

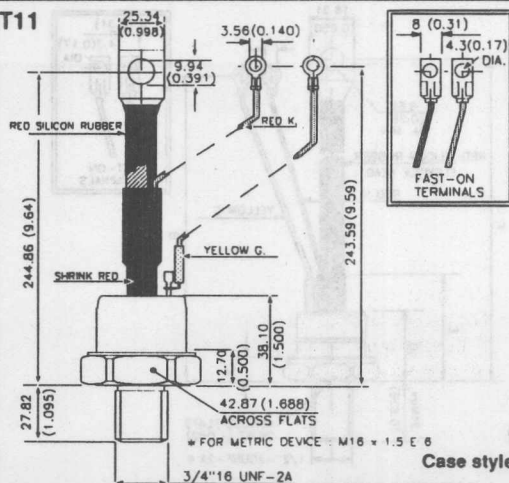


* FOR METRIC DEVICE: M16 x 1.5 E 8

	A	B	C	D	E	F	G	
mm	4.3	220	19	210	38.5	16	27.5	T10 A
inches	(0.17)	(8.66)	(0.75)	(8.26)	(1.51)	(0.63)	(1.08)	
mm	3.56	196.21	19.17	186.64	34.29	9.27	27.35	T10 B
inches	(0.140)	(7.725)	(0.755)	(7.35)	(1.350)	(0.365)	(1.077)	

Case style TO-209AB (TO-93)

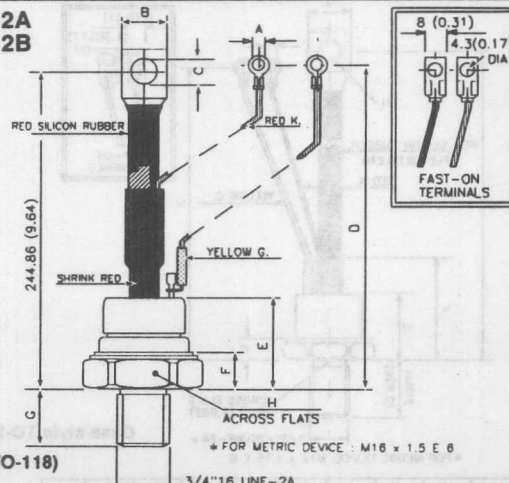
T11



* FOR METRIC DEVICE: M16 x 1.5 E 8

Case style TO-209AE (TO-118)

**T12A
T12B**

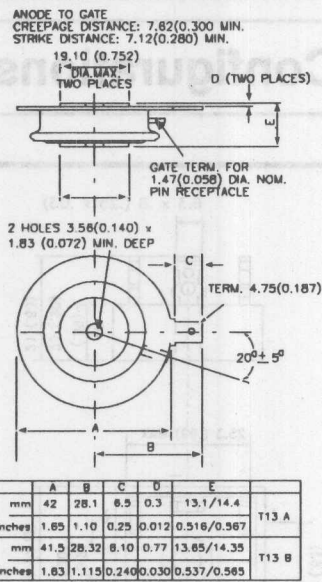


* FOR METRIC DEVICE: M16 x 1.5 E 8

	A	B	C	D	E	F	G	H	
mm	4.3	22	10.5	245	47	21	27.5	45	T12 A
inches	(0.17)	(0.866)	(0.41)	(9.64)	(1.85)	(0.82)	(1.08)	(1.77)	
mm	3.56	25.34	9.94	243.59	38.10	12.70	27.82	42.87	T12 B
inches	(0.140)	(0.998)	(0.391)	(9.59)	(1.500)	(0.500)	(1.095)	(1.688)	

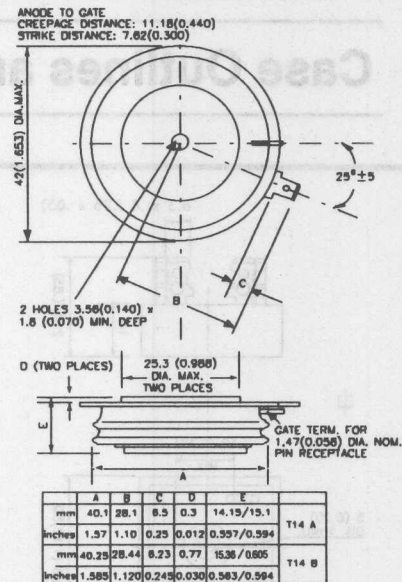
- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request

T13A
T13B



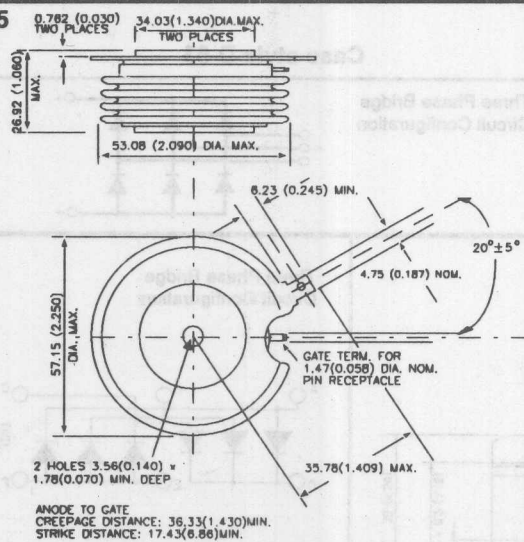
Case style TO-200AB (A-PUK)

T14A
T14B



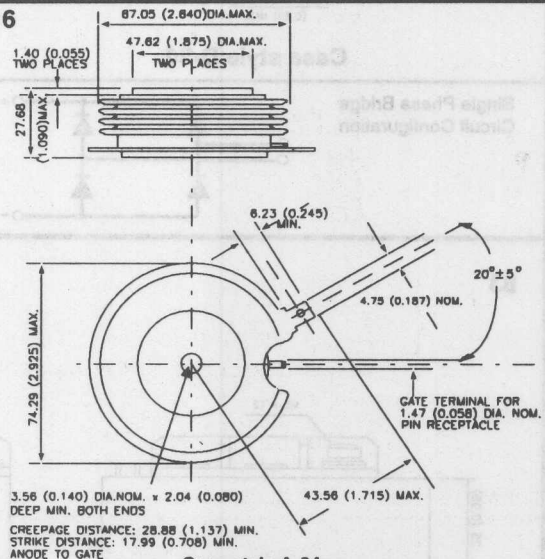
Case style TO-200AB (E-PUK)

T15



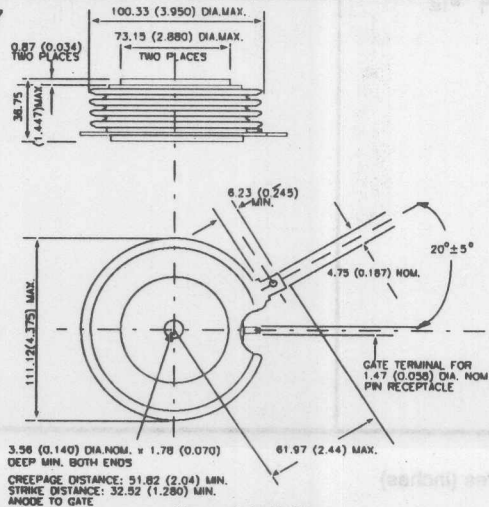
Case style TO-200AC

T16



Case style A-24

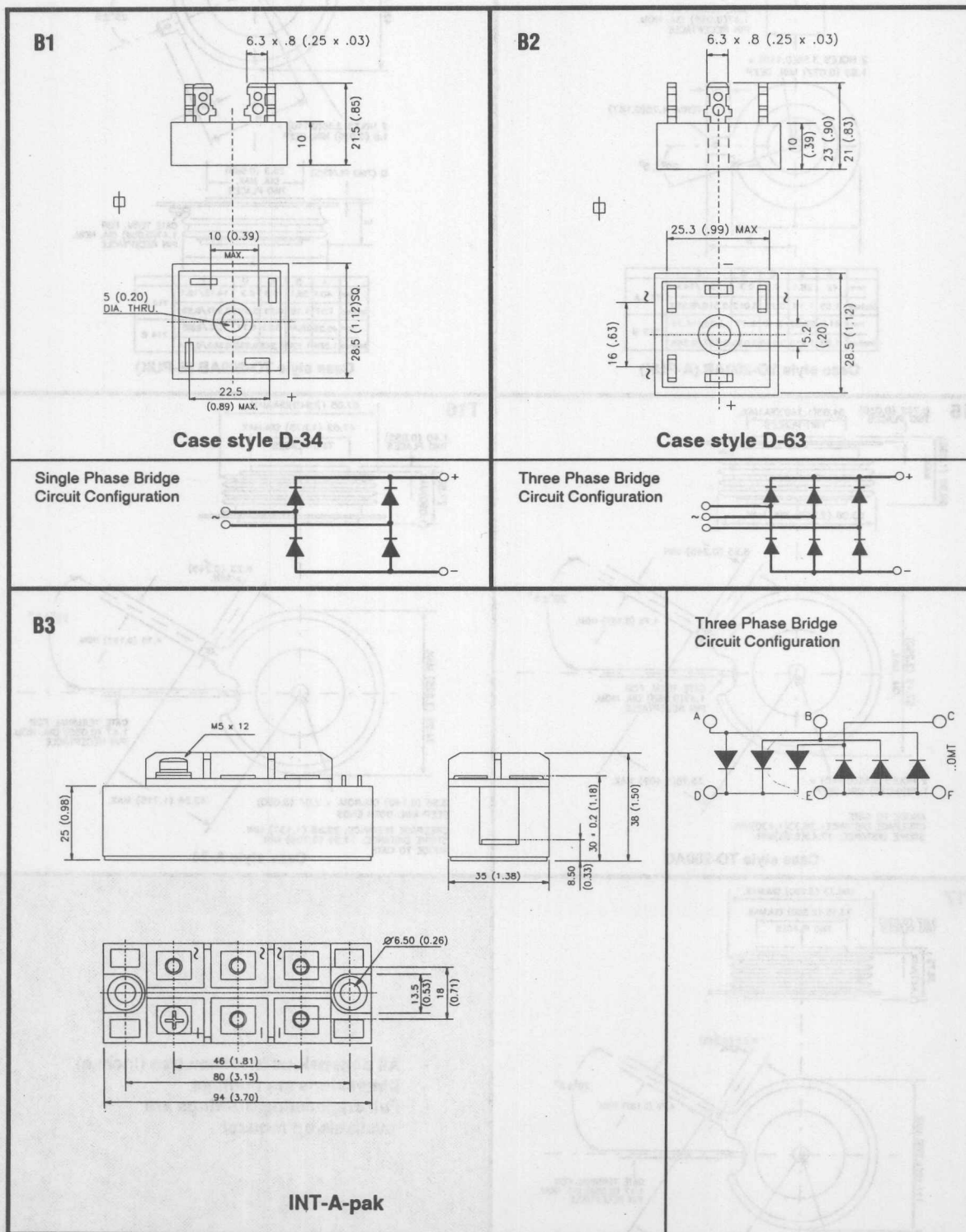
T17



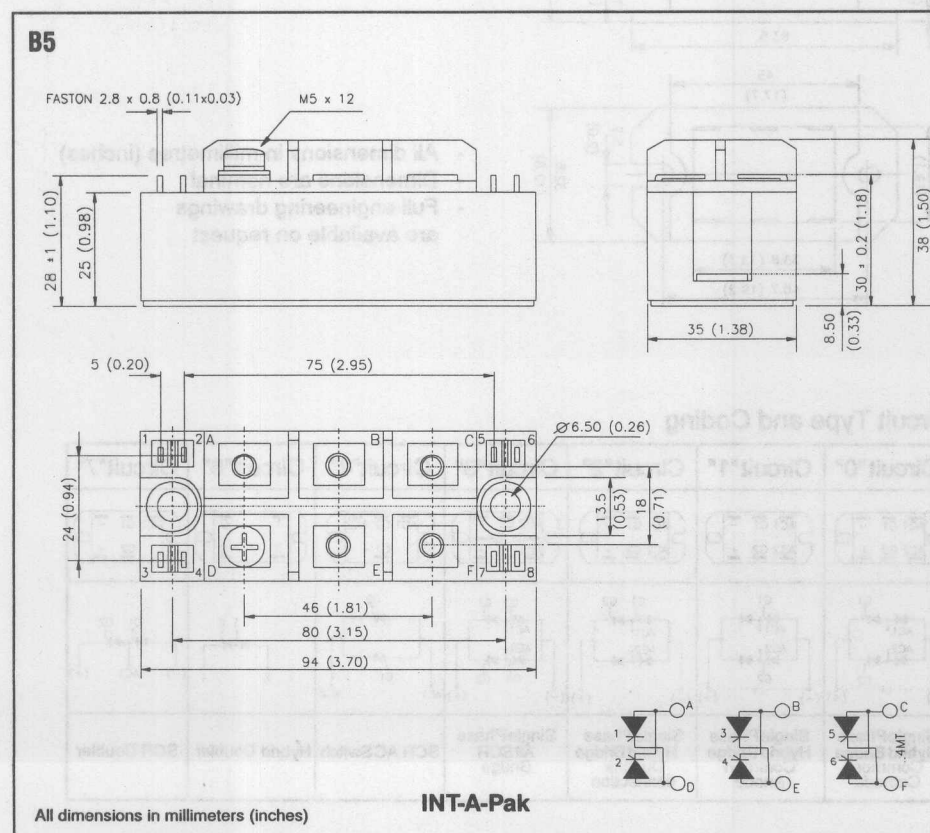
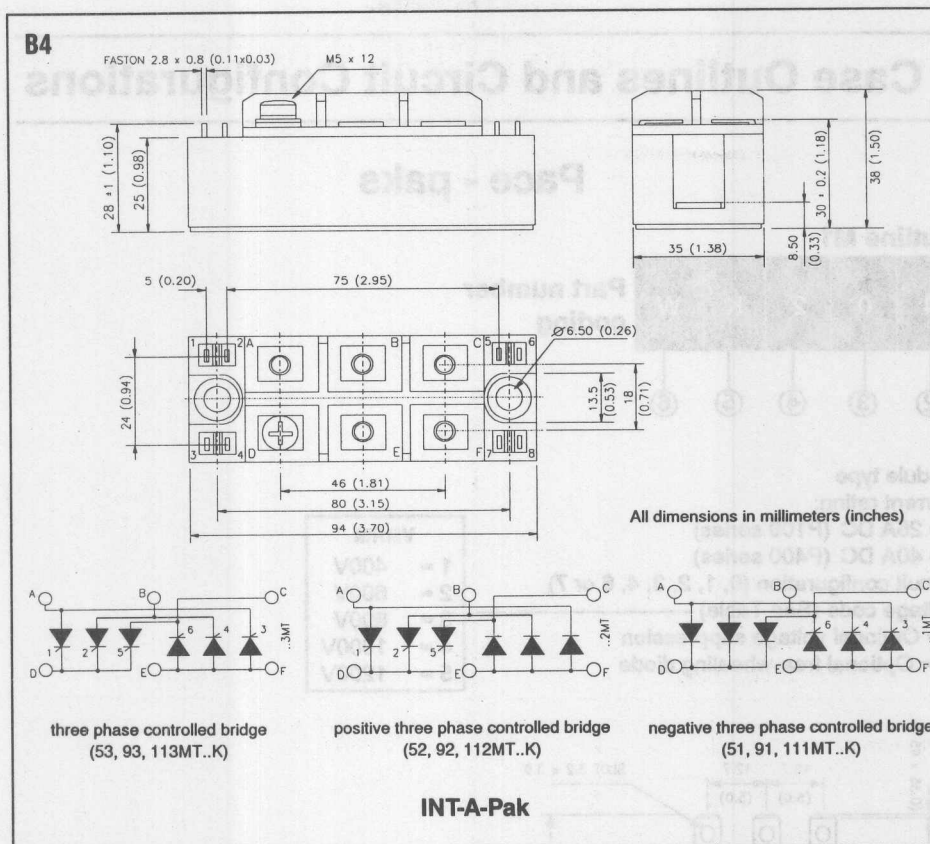
Case style A-36

- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request

Case Outlines and Circuit Configurations



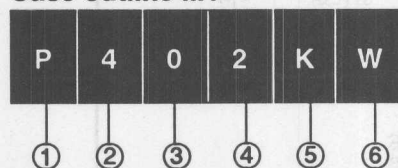
- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request



Case Outlines and Circuit Configurations

Pace - paks

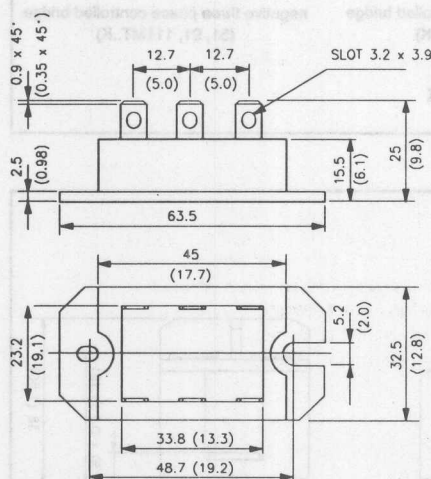
Case outline M1



Part number coding

- 1 - Module type
- 2 - Current rating:
1 = 25A DC (P100 series)
4 = 40A DC (P400 series)
- 3 - Circuit configuration (0, 1, 2, 3, 4, 6 or 7)
- 4 - Voltage code (See Table)
- 5 - K = Optional voltage suppression
- 6 - W = Optional free-wheeling diode

VRRM	
1 =	400V
2 =	600V
3 =	800V
4 =	1000V
5 =	1200V



- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request

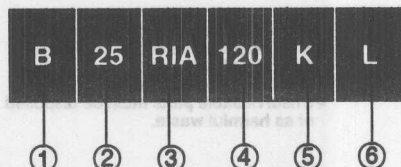
Circuit Type and Coding

Circuit "0"	Circuit "1"	Circuit "2"	Circuit "3"	Circuit "4"	Circuit "6"	Circuit "7"
Single Phase Hybrid Bridge Common Cathode	Single Phase Hybrid Bridge Common Anode	Single Phase Hybrid Bridge Doubler connection	Single Phase All SCR Bridge	SCR AC Switch	Hybrid Doubler	SCR Doubler

Case Outlines and Circuit Configurations

"B" modules

Case outline M2



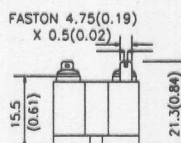
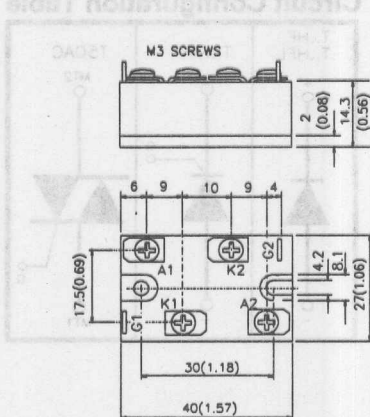
Part number coding

- 1 - Module type
 - 2 - Current range
 - 3 - Circuit configuration (See Circuit Configuration Table)
 - 4 - Voltage code : Code x 10 = VRRM
 - 5 - No code = Standard recovery (diodes)
dv/dt = 100V/μs (thyristors)
- Code = trr (fast diodes)
dv/dt (thyristors)

- 6 - Terminal type:
L = fast-on terminals (SCR, SCR/DIODE and TRIAC configuration)
No letter = screw terminals

trr
S02 = 200ns
S05 = 500ns
S10 = 1000ns

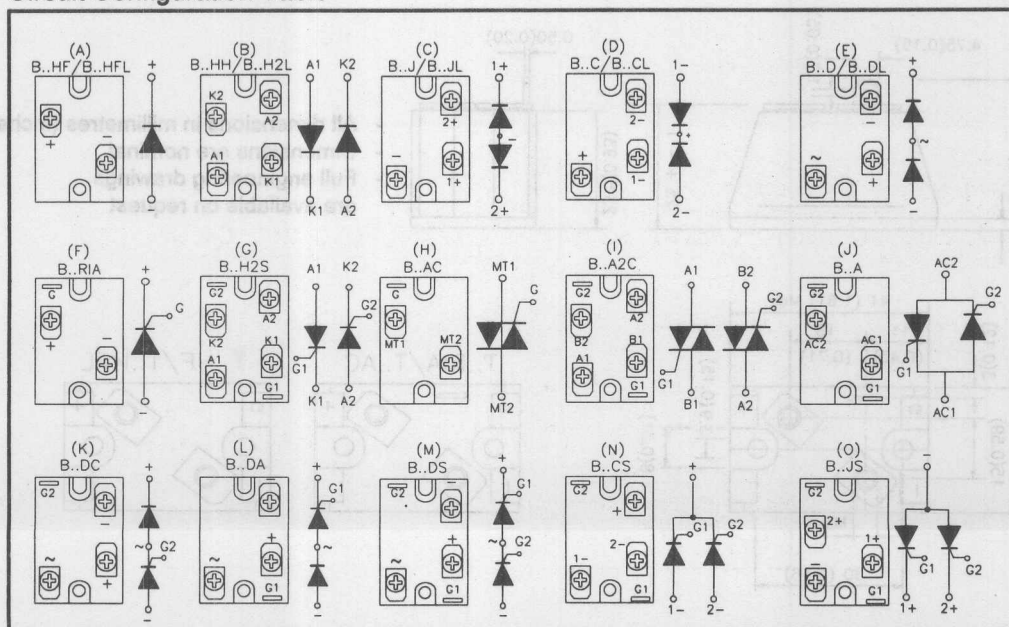
dv/dt
D = 500V/μs
K = 1000V/μs



A	B	C	D
6 (0.236)	9 (0.354)	4.2 (0.165)	8.1 (0.318)

- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request

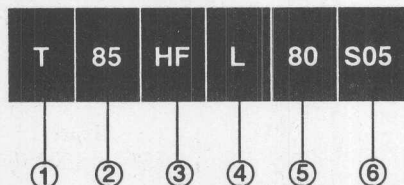
Circuit Configuration Table



Case Outlines and Circuit Configurations

"T" modules

Case outline M3



Part number coding

- May contain beryllium oxide ceramic, and under normal circumstances is non hazardous.
- Do not open, cut or grind.
- Unserviceable parts must be disposed of as harmful waste.

- 1 - Module type
2 - Current ratings : Standard and Fast Recovery diodes

40 = 40A (Avg)
70 = 70A (Avg)
85 = 85A (Avg)
110 = 110A (Avg) (Only Standard Recovery)

: Thyristors

50 = 50A (Avg)
70 = 70A (Avg)
90 = 90A (Avg)

: Triacs

50 = 50A (RMS)

- 3 - Circuit configuration:

HF = for diodes
RIA = for thyristors
AC = for triacs

(See Circuit Configuration Table).

- 4 - No letter = for standard recovery diodes, thyristors and triacs

L = only for fast diodes

- 5 - Voltage code : Code x 10 = VRRM

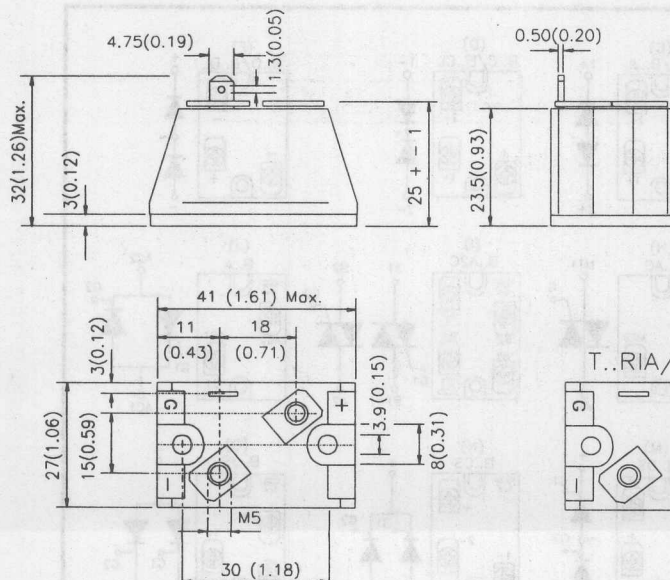
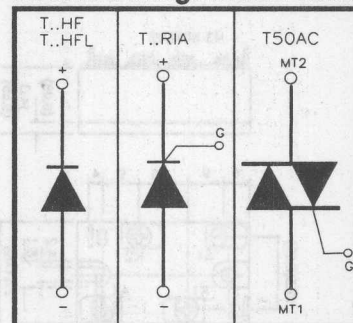
- 6 - trr code (only for fast diodes):

S02 = 200 ns

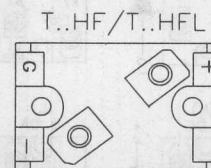
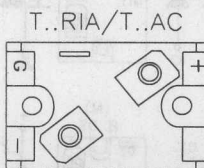
S05 = 500 ns

S10 = 1000 ns

Circuit Configuration Table

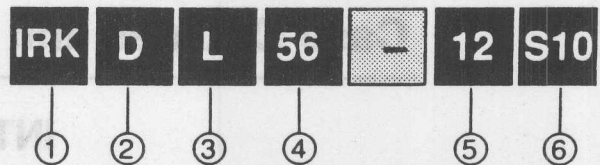
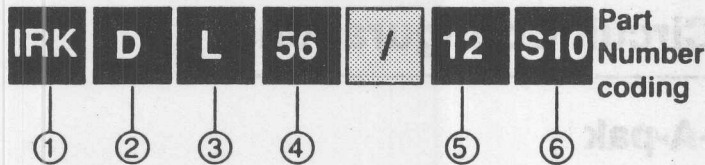


- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request



" / " - Identifies the **NEW** Generation

" = " - Identifies the **OLD** construction



- 1 - Module type
- 2 - Circuit Configuration (See Circuit Configuration Table)
- 3 - No letter = Standard recovery
L = Fast recovery diode
- 4 - Current rating * : IT(AV) = code value
with last digit rounded off "0" or "5"
- 5 - Voltage code : Code x 100 = VRRM

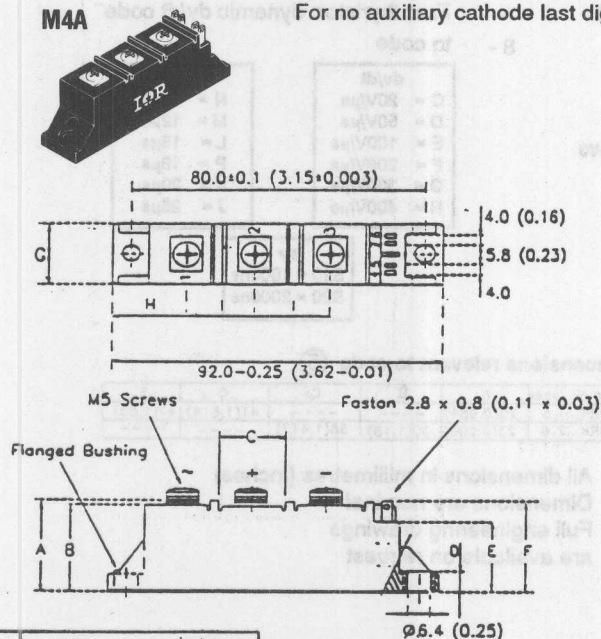
- 6 - No code = Standard recovery (diodes)
dv/dt = 500V/μs (thyristors)
- Code = trr (fast diodes)
dv/dt (thyristors)

trr
S02 = 200ns
S05 = 500ns
S10 = 1000ns

dv/dt
S90 = 1000V/μs

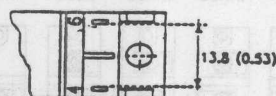
*With auxiliary cathode last digit = "1" or "6"
For no auxiliary cathode last digit = "2" or "7"

M4A



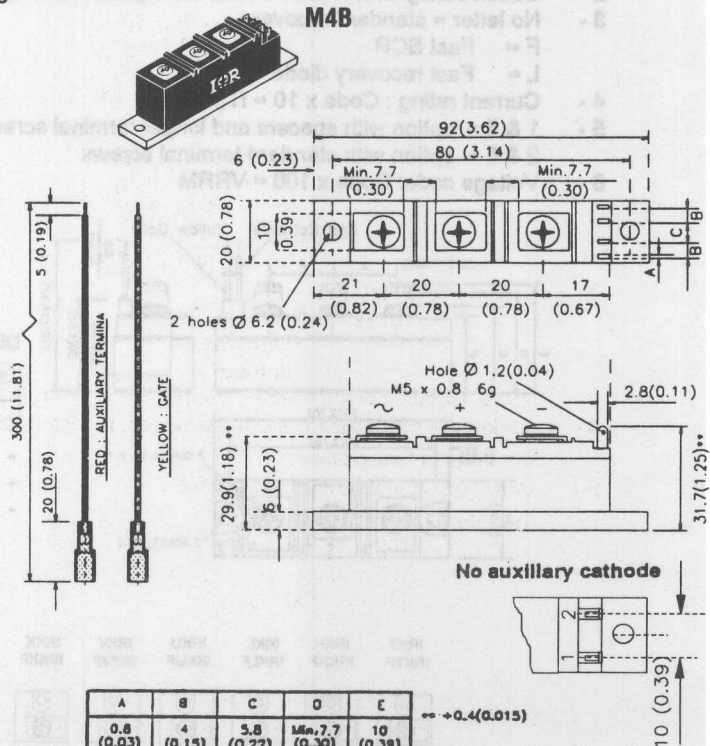
	mm	inches
A	30.0 ± 0.30	(1.18 ± 0.012)
B	29.0 ± 0.20	(1.14 ± 0.007)
C	18.0 ± 0.20	(0.71 ± 0.007)
D	05.8 ± 0.20	(0.23 ± 0.007)
E	24.0 ± 0.10	(0.94 ± 0.003)
F	30.0 ± 1	(1.18 ± 0.040)
G	20.5 ± 0.10	(0.81 ± 0.003)
H	21.0 ± 0.10	(0.83 ± 0.003)
I	20.0 ± 0.05	(0.79 ± 0.019)

no auxiliary cathode

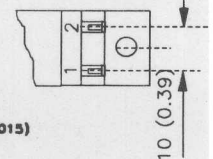


All dimensions in millimeters (inches)

M4B



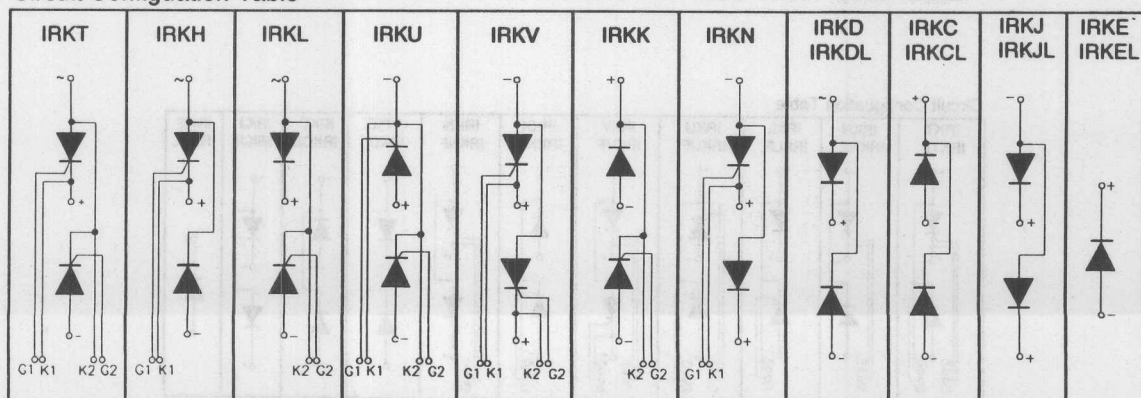
No auxiliary cathode



A	B	C	D	E
0.8 (0.03)	4 (0.15)	5.8 (0.22)	Min. 7.7 (0.30)	10 (0.39)

± 0.4 (0.015)

Circuit Configuration Table



Case Outlines and Circuit Configurations

INT-A-pak

Case outline M5



Part number coding

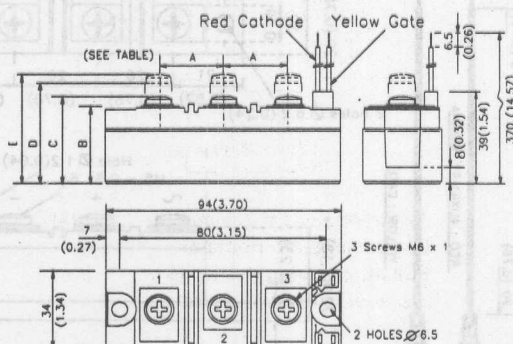
- Contains beryllium oxide ceramic, and under normal circumstances is non hazardous.
- Do not open, cut or grind.
- Unserviceable parts must be disposed of as harmful waste.

- 1 - Module type
- 2 - Circuit configuration (See Circuit Configuration Table)
- 3 - No letter = standard recovery
F = Fast SCR
L = Fast recovery diode
- 4 - Current rating : Code x 10 = IT(AV)
- 5 - 1 & 5 = option with spacers and longer terminal screws
2 & 6 = option with standard terminal screws
- 6 - Voltage code: Code x 100 = VRRM

- 7 - Fast diode : trr code
Fast thyristor: dynamic dv/dt code
- 8 - tq code

dv/dt	tq
C = 20V/μs	N = 10μs
D = 50V/μs	M = 12μs
E = 100V/μs	L = 15μs
F = 200V/μs	P = 18μs
G = 300V/μs	K = 20μs
H = 400V/μs	J = 25μs

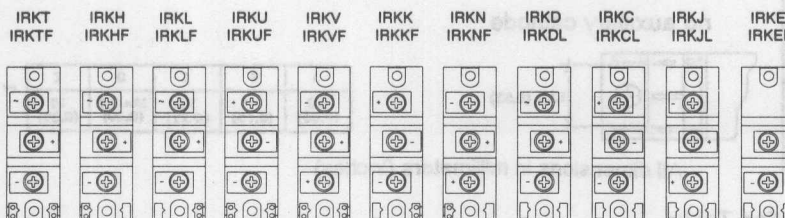
trr
S10 = 1000ns
S20 = 2000ns



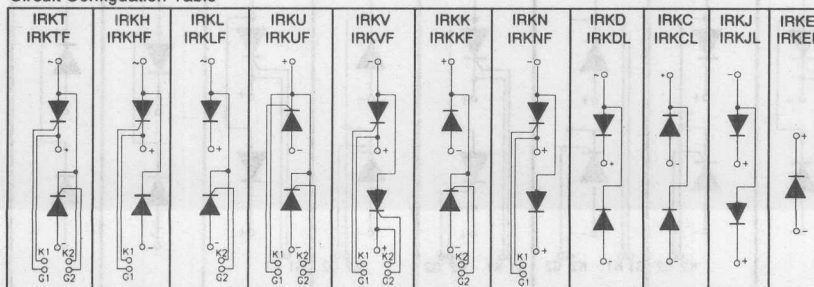
Dimensions relevant to code ⑤

For all types	A	B	C	D	E
IRK...1.5	25(0.984)	---	---	41(1.614)	47(1.85)
IRK...2.6	23(0.906)	30(1.18)	36(1.417)	---	---

- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request



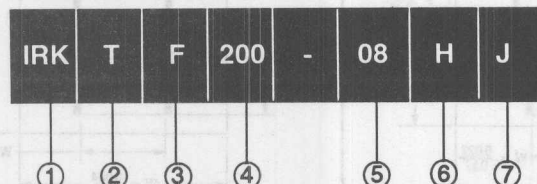
Circuit Configuration Table



Case Outlines and Circuit Configurations

MAGN-A-pak

Case outline M6

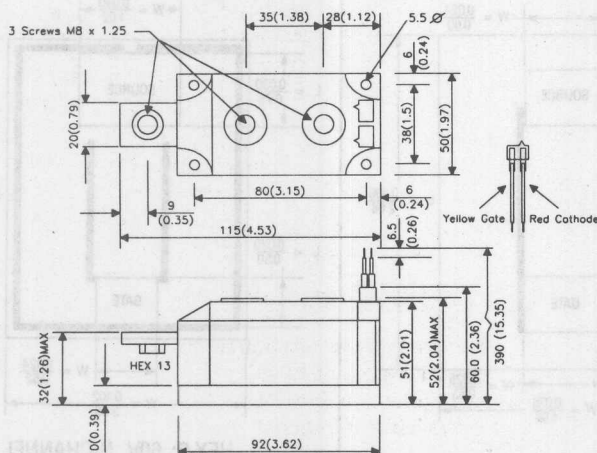


Part number coding

- Contains beryllium oxide ceramic, and under normal circumstances is non hazardous.
- Do not open, cut or grind.
- Unserviceable parts must be disposed of as harmful waste.

- 1 - Module type
- 2 - Circuit configuration (See Circuit Configuration Table)
- 3 - No letter = standard recovery
F = Fast SCR
L = Fast recovery diode

- 4 - Current rating : IT(AV)
- 5 - Voltage code: Code x 100 = VRRM
- 6 - Fast diode : trr code
Fast thyristor: dynamic dv/dt code
- 7 - tq code



dv/dt
C = 20V/μs
D = 50V/μs
E = 100V/μs
F = 200V/μs
G = 300V/μs
H = 400V/μs

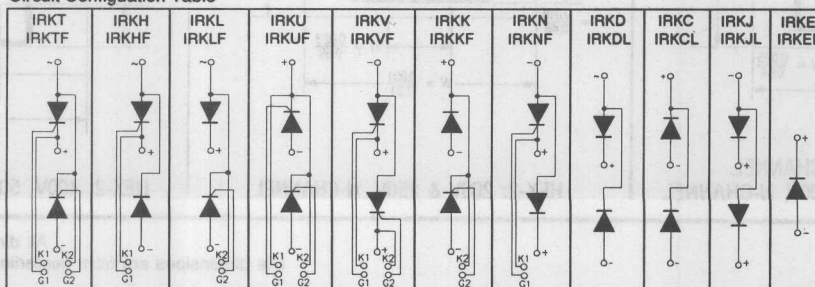
tq
N = 10μs
M = 12μs
L = 15μs
P = 18μs
K = 20μs
J = 25μs

trr
S10 = 1000ns
S20 = 2000ns

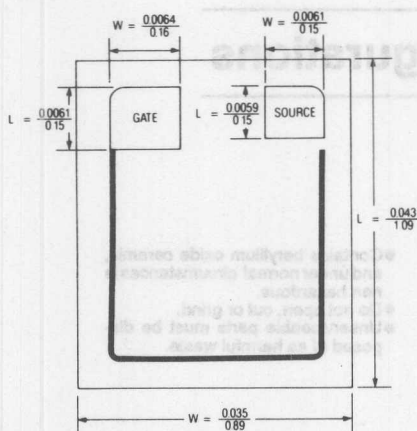
- All dimensions in millimetres (inches)
- Dimensions are nominal
- Full engineering drawings are available on request



Circuit Configuration Table

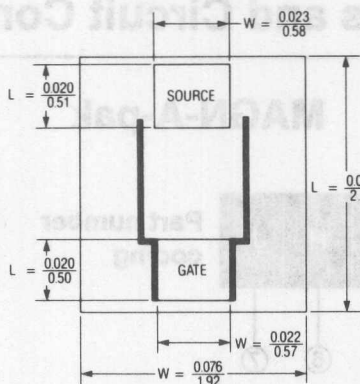


D1



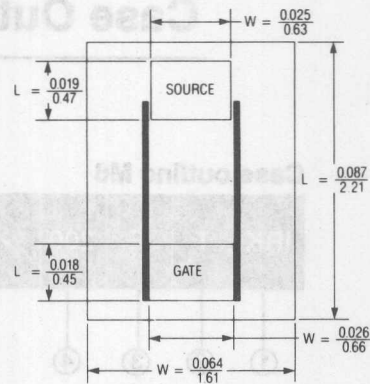
HEX-Z: 100V, N-CHANNEL

D2



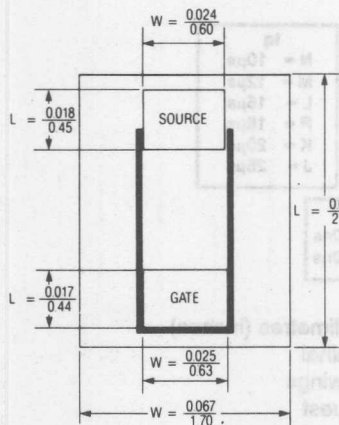
HEX-1: 60V, N-CHANNEL
LOGIC LEVEL: HEX-1: 60V, N-CHANNEL

D3



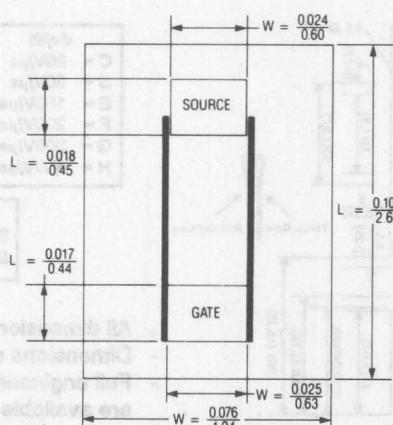
HEX-1: 100V, N-CHANNEL
LOGIC LEVEL: HEX-1: 100V, N-CHANNEL

D4



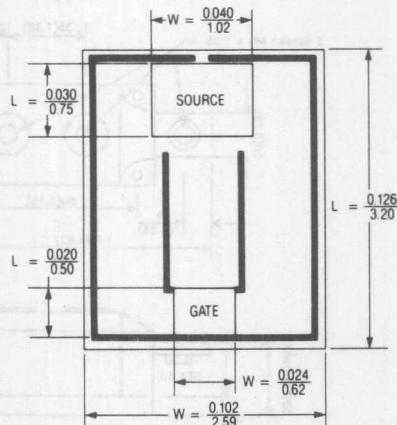
HEX-1: 200V & 250V, N-CHANNEL

D5



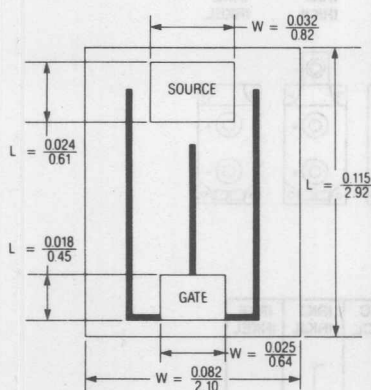
HEX-1: 400V, N-CHANNEL

D6



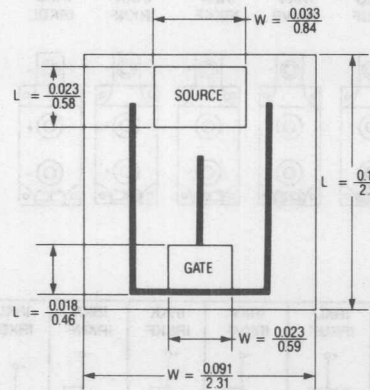
HEX-2: 60V, N-CHANNEL
LOGIC LEVEL: HEX-2: 60V, N-CHANNEL

D7



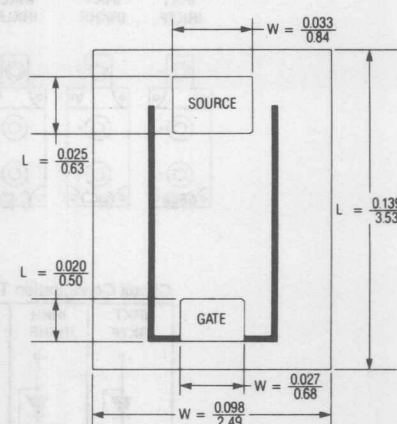
HEX-2: 100V, N-CHANNEL
LOGIC LEVEL: HEX-2: 100V, N-CHANNEL

D8



HEX-2: 200V & 250V, N-CHANNEL

D9

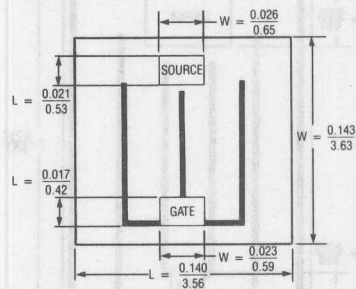


HEX-2: 400V, 500V, & 600V, N-CHANNEL

Unless otherwise noted
all die shown are GEN III

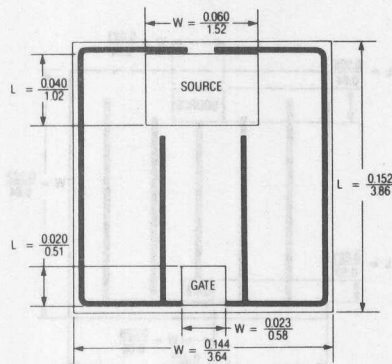
All dimensions shown in inches/mm
Die dimensions are from centerline to centerline of scribe alleys

D10



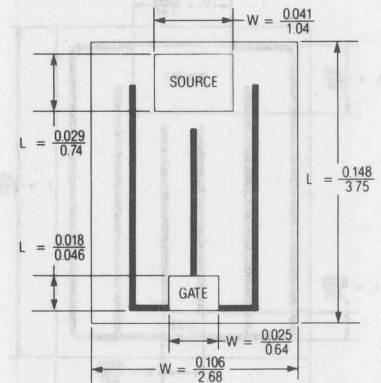
HEX-2: 800V, 900V, & 1000V, N-CHANNEL

D11



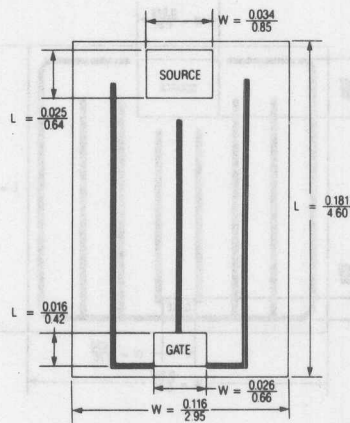
HEX-3: 60V, N-CHANNEL
LOGIC LEVEL: HEX-3: 60V, N-CHANNEL

D12



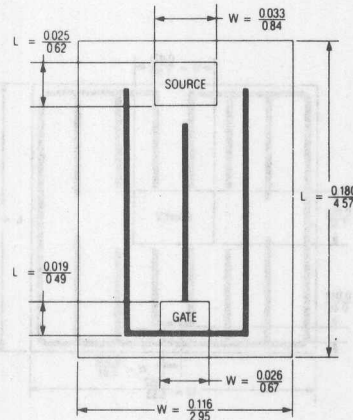
HEX-3: 100V, N-CHANNEL
LOGIC LEVEL: HEX-3: 100V, N-CHANNEL

D13



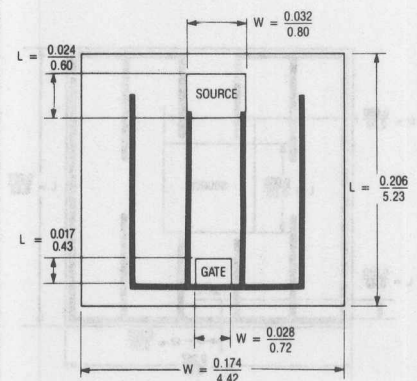
HEX-3: 200V & 250V, N-CHANNEL

D14



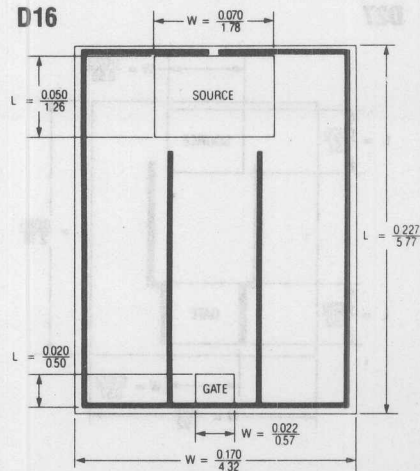
HEX-3: 400V, 500V, & 600V, N-CHANNEL

D15



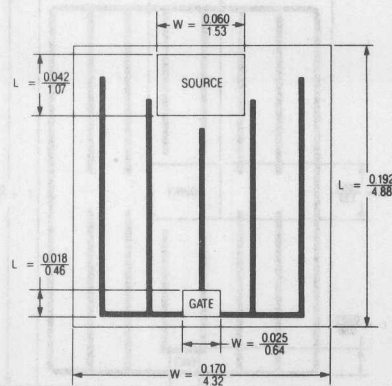
HEX-3: 800V, 900V, & 1000V, N-CHANNEL

D16



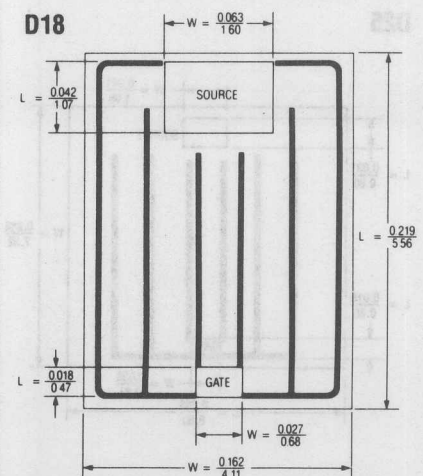
HEX-4: 60V, N-CHANNEL
LOGIC LEVEL: HEX-4: 60V, N-CHANNEL

D17



HEX-4: 100V, N-CHANNEL
LOGIC LEVEL: HEX-4: 100V, N-CHANNEL

D18

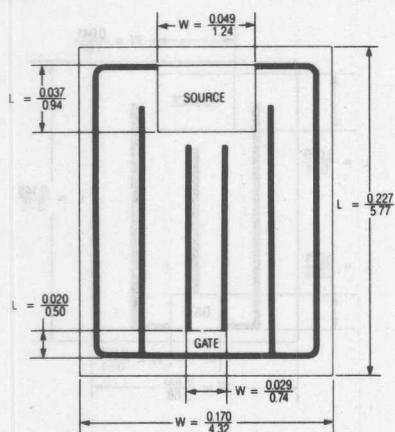


HEX-4: 200V & 250V, N-CHANNEL

Unless otherwise noted
all die shown are GEN III

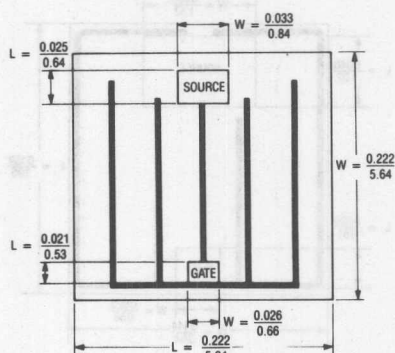
All dimensions shown in inches/mm
Die dimensions are from centerline to centerline of scribe alleys

D19



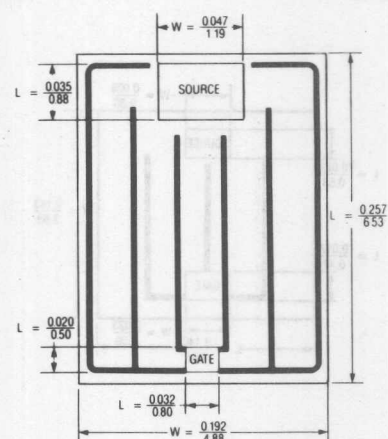
HEX-4: 400V, 500V, & 600V, N-CHANNEL

D20



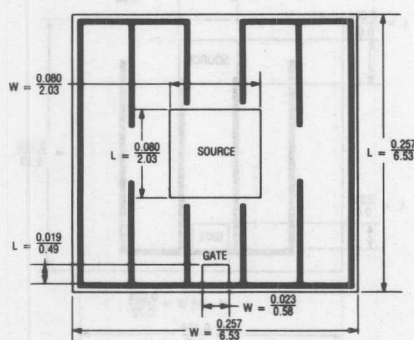
HEX-4: 800V, 900V, & 1000V, N-CHANNEL

D21



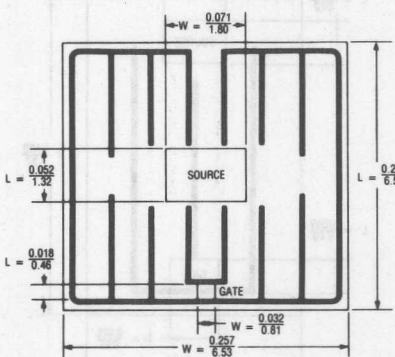
HEX-4.5: 500V, N-CHANNEL

D22



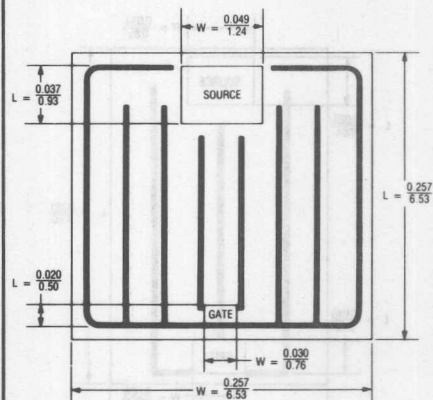
HEX-5: 60V, N-CHANNEL

D23



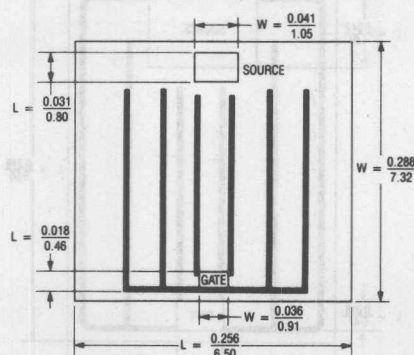
HEX-5: 100V, 200V, & 250V, N-CHANNEL

D24



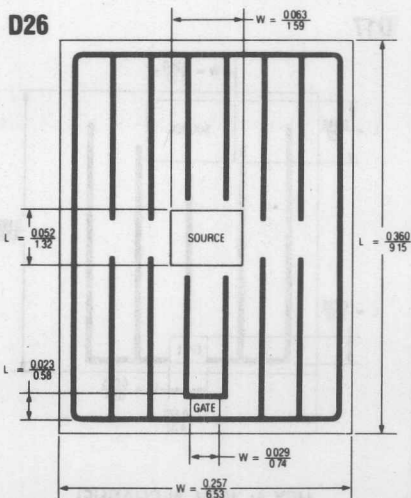
HEX-5: 400V, 500V, & 600V, N-CHANNEL

D25



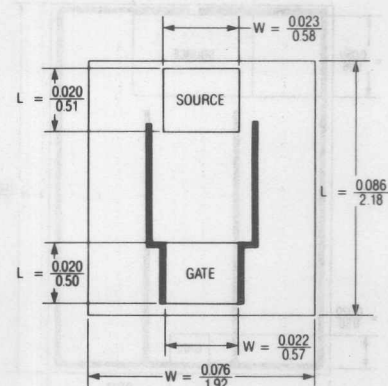
HEX-5: 800V, 900V, & 1000V, N-CHANNEL

D26



HEX-6: 400V & 500V, N-CHANNEL

D27

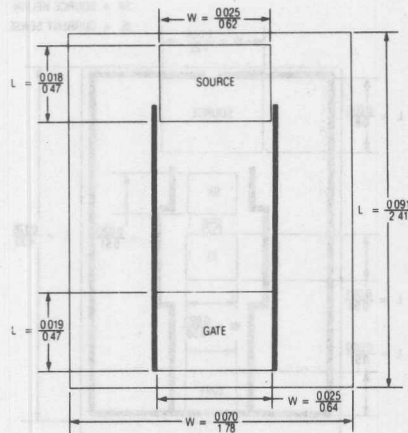


HEX-1: -60V, P-CHANNEL

Unless otherwise noted
all die shown are GEN III

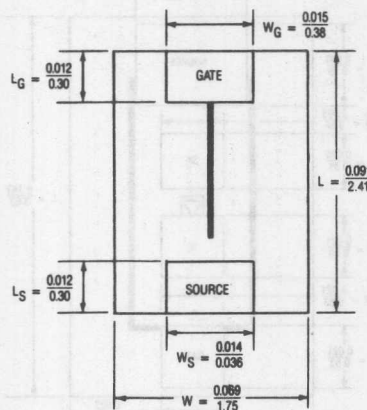
All dimensions shown in inches/mm
Die dimensions are from centerline to centerline of scribe alleys

D28



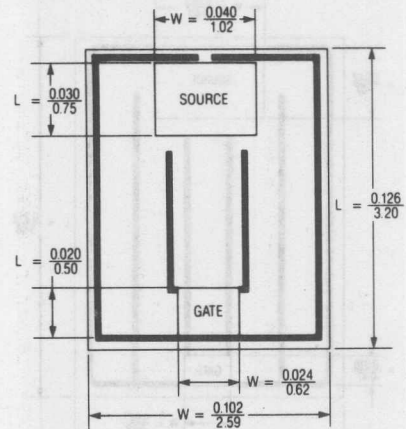
HEX-1: -100V, P-CHANNEL

D29



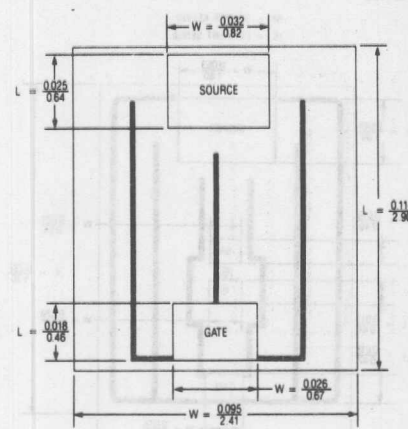
HEX-1: -200V, P-CHANNEL GEN I

D30



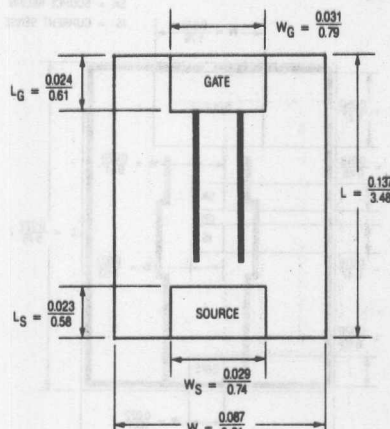
HEX-2: -60V, P-CHANNEL

D31



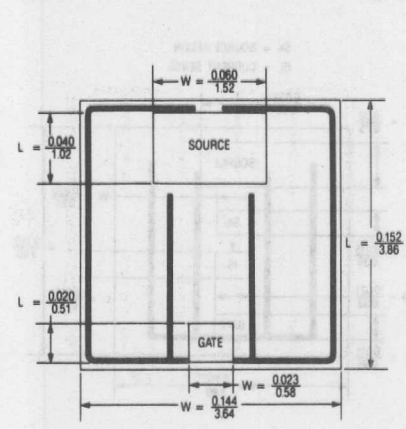
HEX-2: -100V, P-CHANNEL

D32



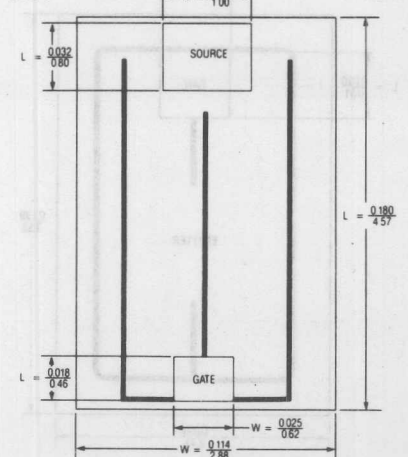
HEX-2: -200V, P-CHANNEL GEN I

D33



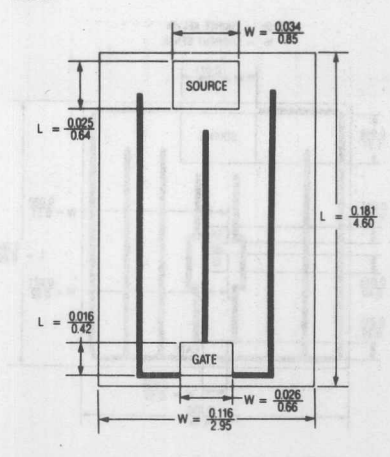
HEX-3: -60V, P-CHANNEL

D34



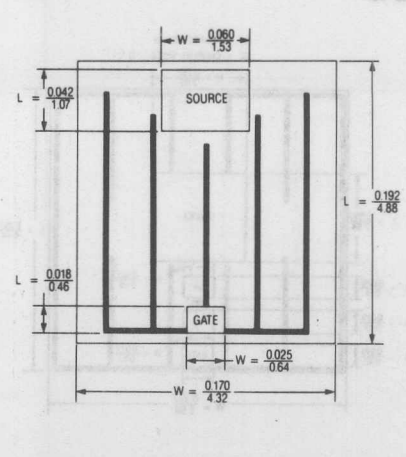
HEX-3: -100V, P-CHANNEL

D35



HEX-3: -200V, P-CHANNEL

D36

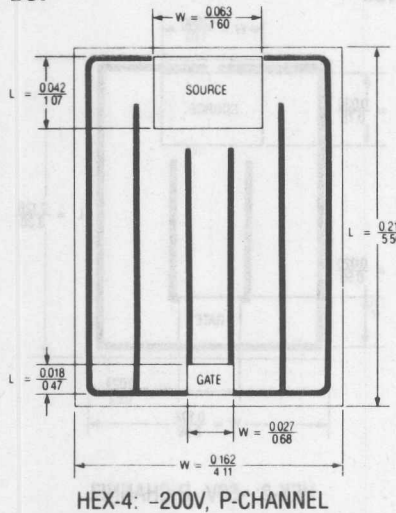


HEX-4: -100V, P-CHANNEL

Unless otherwise noted
all die shown are GEN III

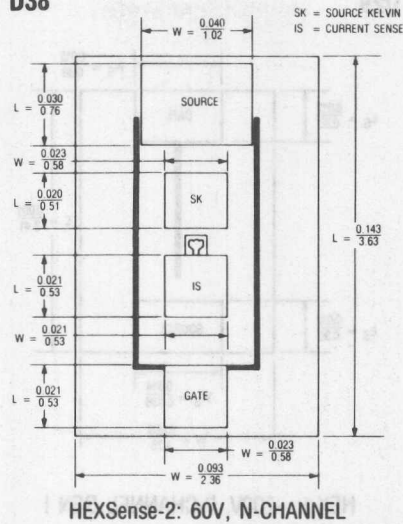
All dimensions shown in inches/mm
Die dimensions are from centerline to centerline of scribe alleys

D37



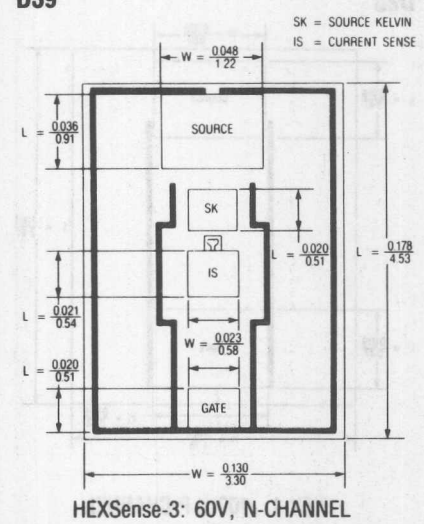
HEX-4: -200V, P-CHANNEL

D38



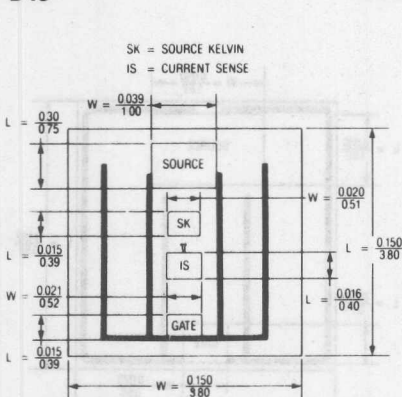
HEXSense-2: 60V, N-CHANNEL

D39



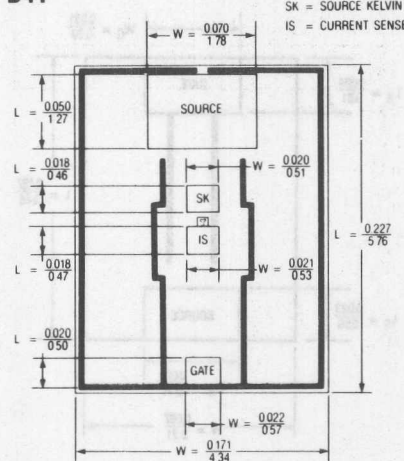
HEXSense-3: 60V, N-CHANNEL

D40



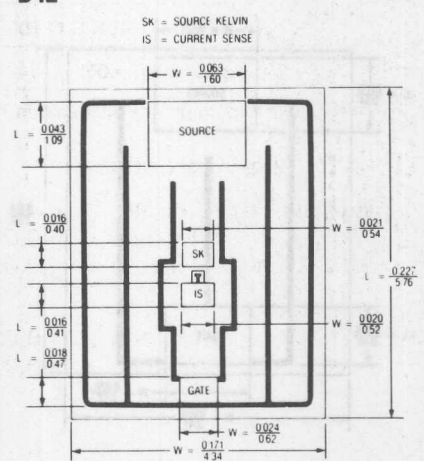
HEXSense-3: 100V TO 500V, N-CHANNEL

D41



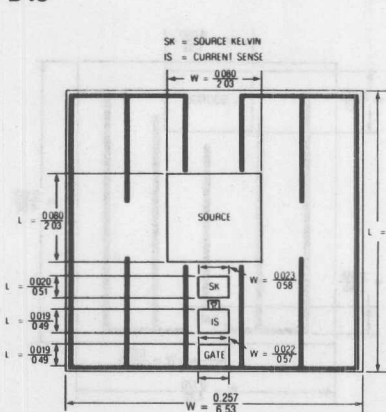
HEXSense-4: 60V, N-CHANNEL

D42



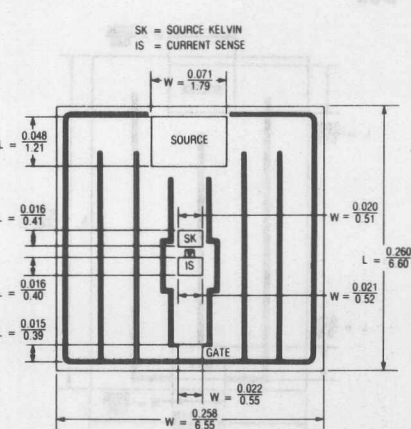
HEXSense-4: 100V TO 500V, N-CHANNEL

D43



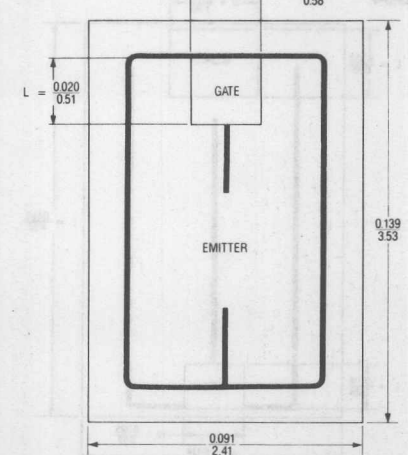
HEXSense-5: 60V, N-CHANNEL

D44



HEXSense-5: 100V TO 500V, N-CHANNEL

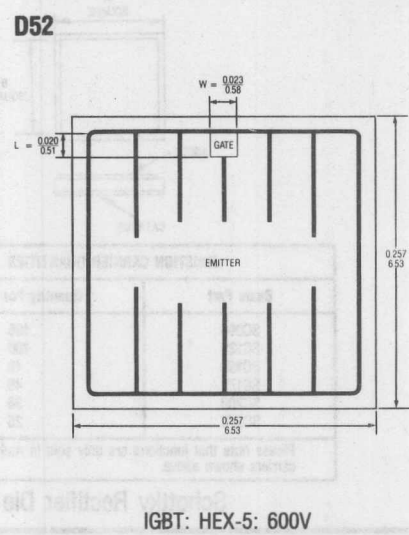
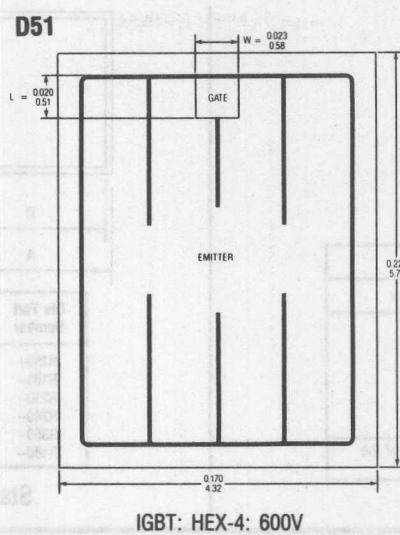
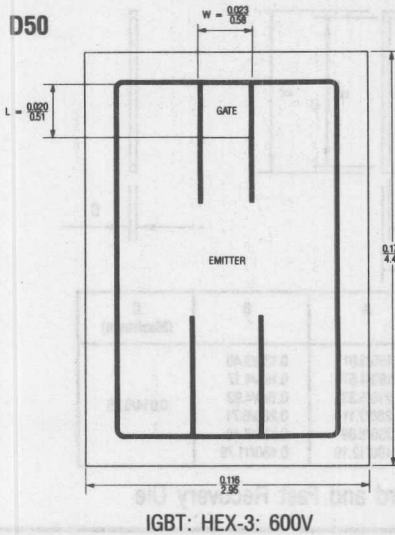
D49



IGBT: HEX-2: 600V

Unless otherwise noted
all die shown are GEN III

All dimensions shown in inches/mm
Die dimensions are from centerline to centerline of scribe alleys



Chip Tray Capacity by Die Size

HEXFET DIE	HEX-Z	HEX-1	HEX-2	HEX-3	HEX-4	HEX-5	HEX-6
Chip Tray Capacity	400	140	96	45	35	16	15

Please note that chips are only sold in multiples of the trays shown above.

Dimensional Tolerances

Bonding Pad L or W:

< 0.025 in., Tolerance = ± 0.0005 in.
> 0.025 in., Tolerance = ± 0.001 in.

Overall Die L or W:

0.050 in., Tolerance = ± 0.004 in.
> 0.050 in., Tolerance = ± 0.008 in.

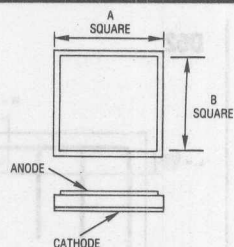
Unless otherwise noted
all die shown are GEN III

All dimensions shown in inches/mm
Die dimensions are from centerline to centerline of scribe alleys

Rectifier and Thyristor Die Outline

Rectifier Die⁽¹⁾

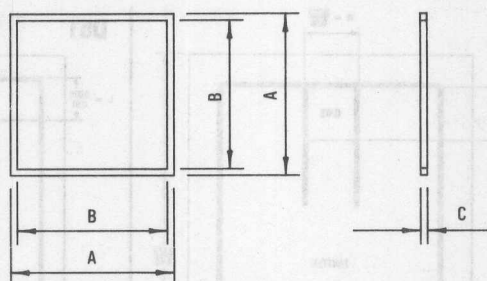
International
IOR Rectifier



JUNCTION CARRIER QUANTITIES	
Basic Part	Quantity Per Carrier
SC090	196
SC125	100
SC150	49
SC175	49
SC200	36
SC275	25

Please note that junctions are only sold in multiples of the carriers shown above.

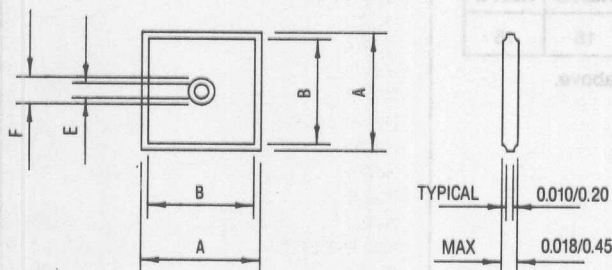
Schottky Rectifier Die



Die Part Number	A	B	C (Maximum)
IR150--	0.150/3.81	0.130/3.40	0.014/0.36
IR180--	0.180/4.57	0.160/4.17	
IR210--	0.210/5.33	0.190/4.93	
IR280--	0.280/7.11	0.260/6.71	
IR350--	0.350/8.89	0.330/8.48	
IR480--	0.480/12.19	0.460/11.79	

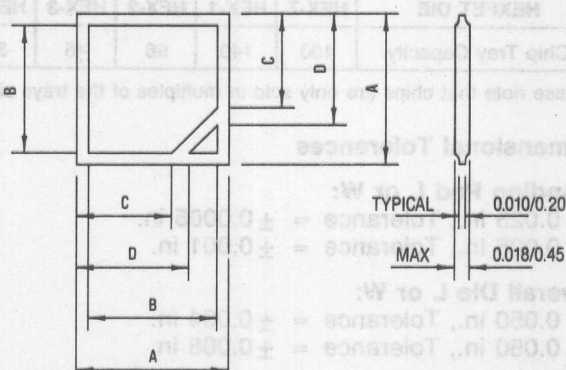
Standard and Fast Recovery Die

Thyristor Die



Die Part Number	A	B	E	F
IR210SG/TG	0.210/5.33	0.170/4.32	0.038/0.81	0.064/1.62
IR350SG/TG	0.350/8.89	0.310/7.87	0.040/1.02	0.080/2.03

Center Gate Thyristor and Triac Die



Die Part Number	A	B	E	F
IR230SG	0.230/5.84	0.190/4.83	0.159/4.00	0.171/4.04
IR480SG	0.480/12.19	0.404/10.26	0.299/7.60	0.350/9.02

Corner Gate Thyristor Die

JUNCTION CARRIER QUANTITIES

Basic Part Number	Quantity Per Carrier
IR150DR/IR150LR	361
IR180DR	256
IR210DR/IR210LR	196
IR280DR/IR280LR	121
IR350DR/IR350LR	100
IR480DR/IR480LR	49
IR210SG/IR210TG IR230SG	Up to 2500 per jar
IR350SG/IR250TG	Up to 1000 per jar
IR480SG	Up to 500 per jar

Please note that Junctions are only sold in multiples of the carriers shown above.

PART NO./SERIES	PAGE NO.	PART NO./SERIES	PAGE NO.	PART NO./SERIES	PAGE NO.
100HF20-100HF160	65	16RIA10-16RIA160	84	250JB05L-250JB16L	111
100JB05L-100JB16L	111	16RIF10W15-16RIF60W15	78	25AC10A-25AC120A	92
104MT80K-104MT160K	114	16RIF10W20-16RIF60W20	78	25CPF10-25CPF40	48
10CTF10-10CTF40	48	180NQ035-180NQ045	42	25CTQ035-25CTQ045	43
10CTQ150	43	181NQ035-181NQ045	42	25F10-25F120	63
10D05-10D10	62	181RK120-181RK100	87	25GQ045	130
10DF1-10DF8	48	182NQ030	42	25JPF10-25JPF40	48
10JTF10-10JTF40	48	183NQ080,100	42	25RIA10-25RIA120	123
10MF2	48	185NQ015	42	25RIA10-25RIA160	84
10MQ040-10MQ090	40	18TQ035-18TQ045	41	26MB05A-26MB160A	111
10RIA10-10RIA120	84,123	19TQ015	41	26MT5-26MT160	112
10RIF10W15-10RIF60W15	78	1H-38H HV Columns	137	2N1792-2N1804	85
10RIF10W20-10RIF60W20	78	1N1183-1N1190	63	2N1792-2N1806	131
10TQ035-10TQ045	41	1N1183A-1N1190A	64	2N1805-2N1807	85
110MT80K-110MT160K	112	1N1199A-1N1206A	63	2N1805,06	131
110RIA10-110RIA120	86	1N2054-1N2068	67	2N1909-2N1916	85
111MT80K-111MT160K	115	1N2069-1N2071	62	2N1910-2N1916	131
111RK110-111RK120	86	1N2069A-1N2071A	62	2N2023-2N2030	85
112MT80K-112MT160K	115	1N2128A-1N2138A	64	2N2024-2N2030	131
113MT80K-113MT160K	115	1N3085-1N3092	66	2N3091-2N3097	131
11DF1-11DF4	48	1N3111	66	2N3091-2N3098	85
11DQ03-11DQ10	40	1N3164,R-1N3175,R	131	2N5204-2N5207	84
120NQ035-120NQ045	42	1N3208-1N3214	63	2N6756	36
121NQ035-121NQ045	42	1N3288A-1N3296A	65	2N6756-2N6770	120
122NQ030	42	1N3289,R-1N3295,R	131	2N6758	36
123NQ080,100	42	1N3670A-1N3673A	63	2N6760	36
124NQ035-124NQ045	42	1N3735-1N3743	67	2N6762	36
125NQ015	42	1N3765-1N3768	63	2N6764	36
12CGQ150	130	1N3879-1N3883	50	2N6764-2N6768	125
12CTQ035-12CTQ045	43	1N3889-1N3893	50	2N6766	36
12F10-12F120	63	1N4001-1N4007	62	2N6768	36
12F10B-12F120B	63	1N4044-1N4056	67	2N6770	36
12FL10S02-12FL60S02	50	1N4816-1N4822	62	2N6782	35,125
12FL10S05-12FL100S05	50	1N5052-1N5054	62	2N6782-2N6802	122,125
12FL10S10-12FL100S10	50	1N5162	66	2N6783	See 2N6784
12F(R)10-12F(R)120	124	1N5401-1N5408	62	2N6784	35
12TQ035-12TQ045	41	1N6095,6096	41	2N6785	See 2N6786
130HF20-130HF160	65	1N6097,6098	41	2N6786	35
130MT80K-130MT160K	112	1N6391	41,121	2N6788	35
150CMQ035-150CMQ045	44	1N6392	41,121	2N6789	See 2N6790
150HF10-150HF120	67	200CNQ035-200CNQ045	45	2N6790	35
150K10AM-150K120AM	65	200HF10-200HF120	67	2N6791	See 2N6792
150K5A-150K120A	65	201CNQ035-201CNQ045	45	2N6792	35
150KS5-150KS120	67	203CNQ080,100	45	2N6793	See 2N6794
150L5A-150L120A	66	20CLQ045	130	2N6794	35
151CMQ035-151CMQ045	44	20CTQ035-20CTQ045	43	2N6796	35,125
152CMQ030	44	20D05-20D10	62	2N6797	See 2N6798
153CMQ080,100	44	20FQ035-20FQ045	41	2N6798	35,125
15CGQ100	130	20RIF10W15-20RIF60W15	78	2N6799	See 2N6800
15CLQ100	130	20RIF10W20-20RIF60W20	78	2N6800	35,125
15CTQ035-15CTQ045	43	20TQ035-20TQ045	41	2N6801	See 2N6802
15MQ040	40	21FQ035-21FQ045	41	2N6802	35,125
160CMQ035-160CMQ045	44	21PT5-21PT60	62	2N6804	36,120,125
160MT80K-160MT160K	112	220CNQ030	45	2N6806	36,120,125
161CMQ035-161CMQ045	44	224CNQ035-224CNQ045	45	2N681-2N692	84
162CMQ030	44	225CNQ015	45	2N6845	35
163CMQ080,100	44	22CGQ045	130	2N6845-2N6851	120,122
16CPF10-16CPF40	48	22GQ100	130	2N6847	35
16CTQ080,100	43	22RIA10-22RIA120	123	2N6849	35,125
16F10-16F120	63	22RIA10-22RIA160	84	2N6851	35,125
16FL10S02-16FL60S02	50	240NQ035-240NQ045	42	2N7218-2N7228	120
16FL10S05-16FL100S05	50	241NQ035-241NQ045	42	2N7236,2N7237	120
16FL10S10-16FL100S10	50	242NQ030	42	300HF20-300HF160	67
16F(R)10-16F(R)120	124	243NQ080,100	42	300U10A-300U120A	68
16JPF10-16JPF40	48	244NQ035-244NQ045	42	300U10AM-300U120AM	68
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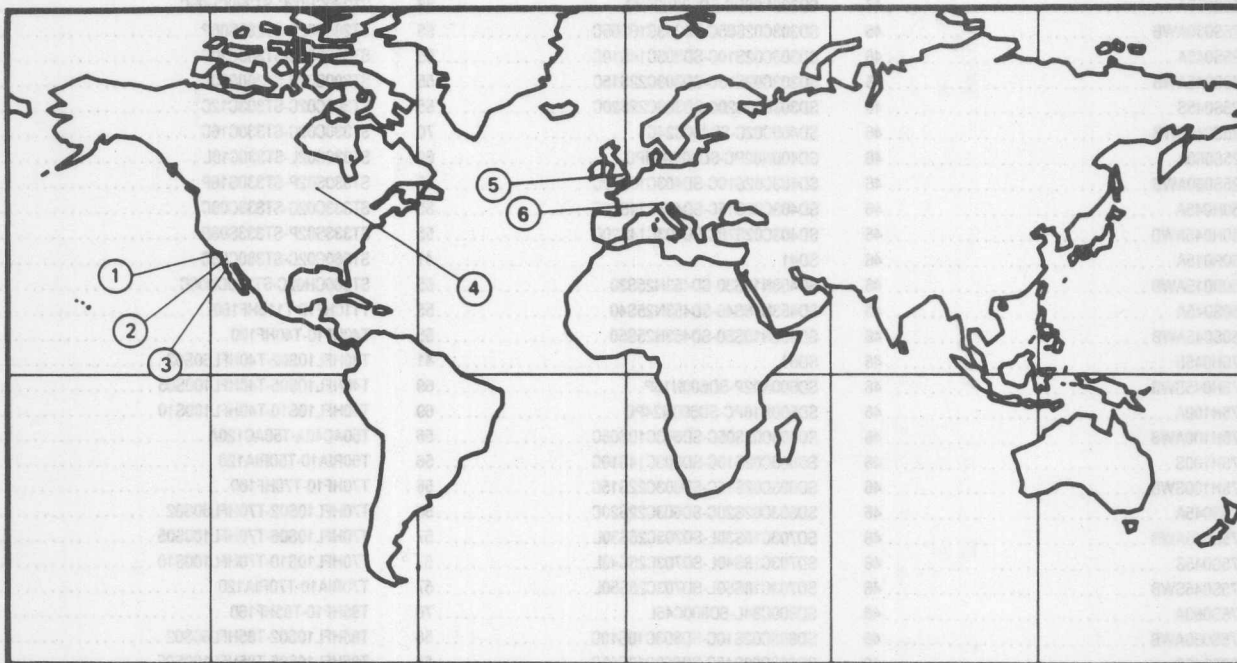
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SC175H045SWB	46	SD600N02P-SD600N16P	69	T40HFL10S05-T40HFL100S05	96
SC175H100A	46	SD600N18PC-SD600N24PC	69	T40HFL10S10-T40HFL100S10	96
SC175H100AWB	46	SD603C02S05C-SD603C10S05C	56	T50AC40A-T50AC120A	106
SC175H100S	46	SD603C02S10C-SD603C14S10C	56	T50RIA10-T50RIA120	106
SC175H100SWB	46	SD603C02S15C-SD603C22S15C	56	T70HF10-T70HF160	102
SC175S045A	46	SD603C02S20C-SD603C22S20C	56	T70HFL10S02-T70HFL60S02	96
SC175S045AWB	46	SD703C18S30L-SD703C25S30L	57	T70HFL10S05-T70HFL100S05	96
SC175S045S	46	SD703C18S40L-SD703C25S40L	57	T70HFL10S10-T70HFL100S10	96
SC175S045SWB	46	SD703C18S50L-SD703C25S50L	57	T70RIA10-T70RIA120	106
SC175S060A	46	SD800C34L-SD800C45L	70	T85HF10-T85HF160	102
SC175S060AWB	46	SD803C02S10C-SD803C10S10C	56	T85HFL10S02-T85HFL60S02	96
SC200E045S	46	SD803C02S15C-SD803C10S15C	56	T85HFL10S05-T85HFL100S05	96
SC200E045SWB	46	SD803C02S20C-SD803C14S20C	56	T85HFL10S10-T85HFL100S10	96
SC200H045S	46	SD823C18S30C-SD823C25S30C	58	T90RIA10-T90RIA120	106
SC200H045SWB	46	SD823C18S40C-SD823C25S40C	58	Z23ZA34.5-Z23ZA150	76
SC200H100S	46	SD823C18S50C-SD823C25S50C	58	ZD23ZB34.5-ZD23ZB150	76
SC200H100SWB	46	SP1110	14		
SC200R015S	46	SP1210	14		
SC200R015SWB	46	SP2110	14		
SC200S030S	46	SP2210	14		
SC200S030SWB	46	SP6110	14		
SC200S045S	46	SP6210	14		
SC200S045SWB	46	SSCIR22150F	140		
SC275H045S	46	SSCIR22250F	140		
SC275H045SWB	46	SSCIR22400F	140		
SC275H100S	46	SSCIR2290	140		
SC275H100SWB	46	SSCIR38150F	140		
SC275S030S	46	SSCIR38250F	140		
SC275S030SWB	46	SSCIR38400F	140		
SC275S045S	46	SSCIR3890	140		
SC275S045SWB	46	ST083C02C-ST083C12C	81		
SD103N02S05P-SD103N10S05P	52	ST083S03P-ST083S12P	79		
SD103N02S10P-SD103N14S10P	52	ST103C02C-ST103C08C	81		
SD103N02S15P-SD103N14S15P	52	ST103S02P-ST103S08P	79		
SD103N02S20P-SD103N22S20P	52	ST110C02C-ST110C16C	89		
SD1053C16S20L-SD1053C25S20L	58	ST110S02P-ST110S14P	86		
SD1100C02C-SD1100C24C	71	ST110S16P	87		
SD1500C12L-SD1500C30L	72	ST110S15P-ST110S17P	87		
SD150N02P-SD150N30PC	66	ST173C06C-ST173C12C	81		
SD153N02S10P-SD153N10S10P	53	ST173S06P-ST173S12P	79		
SD153N02S15P-SD153N14S15P	53	ST180C02C-ST180C20C	89		
SD153N02S20P-SD153N14S20P	53	ST180S02P-ST180S20P	87		
SD200N02P-SD200N24PC	66	ST183C02C-ST183C08C	81		
SD203N02S10P-SD203N14S10P	53	ST183S02P-ST183S08P	80		
SD203N02S15P-SD203N14S15P	53	ST203C06C-ST203C12C	81		
SD203N02S20P-SD203N22S20P	53	ST203S06P-ST203S12P	80		

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